Faculty of Arts & Science

Course Guide

BIOLOGY

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DEPARTMENT OF BIOLOGY

COURSE GUIDE

1994-95

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Efforts have been made to make this course guide as complete and accurate as possible. However, the text was prepared early in 1994, and information may have changed between submission and publication.

THE DEPARTMENT

FACULTY AND STAFF

There are 25 full-time faculty members in the Biology Department and a variable number of adjunct professors and part-time lecturers involved in undergraduate teaching. There are 16 support staff (technicians, lab instructors and secretaries) assisting the teaching and research activities.

FACILITIES

The facilities are located on the Sir George Williams Campus. Teaching and research laboratories are located primarily on the 12th floor of the Hall Building. Most faculty members have their own research laboratories and a number of specialized facilities exist, including aquatic toxicology laboratories, greenhouses, environmental rooms, sterile transfer areas, animal rooms, darkrooms, instrument rooms, holding facilities for water fowl, and a scanning electron microscope.

GRADUATE PROGRAMMES

There is an M.Sc. programme available on both a full-time and part-time basis. The graduate programme is a traditional research and thesis M.Sc. degree programme with students working under the guidance of faculty members. There are currently about 40 students in the department enrolled in the M.Sc. programme. There are also a few Ph.D. students working in the Biology Department on special individually-approved programmes or registered in the Department of Chemistry & Biochemistry programme. The Department expects to introduce its own PhD programme in 1995. Graduate students are accepted to work in 4 general areas of specialization in the department: Animal Biology, Plant Biology, Cell and Molecular Biology and Ecology. Graduate students make a considerable contribution as demonstrators in the undergraduate laboratories. The Department also offers jointly with the Department of Chemistry and Biochemistry a Diploma Programme in Ecotoxicology in which there are approximately 50 full- and part-time students.

RESEARCH ACTIVITIES

Most faculty members in the department are active in research in one or more of the four areas of specialization previously mentioned. Research is well supported by grants and contracts from external agencies and there is a very high rate of publication by faculty members. Research funding allows faculty members to support graduate students, technicians, research associates, post-doctoral fellows, and to purchase scientific equipment. The greatest period of research activity for most faculty members is the summer months, during which time both the department and individual faculty members traditionally hire some undergraduate students to assist in research projects. A number of undergraduates receive Summer NSERC Fellowships and Challenge summer employment assistance to work on research projects during the summer.

Research seminars are presented regularly during the term, at which guest lecturers, faculty members and graduate students present results of their research to the department. Undergraduates are encouraged to attend. The presentation of seminars by students completing Independent Study (BIOL 490) research projects is a very special event each year and attracts great interest from both staff and students. A Biology students' association exist, which, aside from providing student representatives to participate in departmental functions, is involved in various social and academic activities.

CAREER OPPORTUNITIES

B.Sc. Honours or Specialization in Biology, Cell and Molecular Biology, or Ecology, constitute the basic preparation for many graduate programmes (M.Sc., Ph.D. in biological and biomedical sciences, M. Ed., M. Lib. Sci., M.B.A.) and professional programmes (Medicine, Dentistry, Veterinary Medicine, Law).

Graduates at the B.Sc. level may seek employment as technicians and research assistants in government, hospital, industrial and university laboratories. Those wishing to pursue more senior research or supervisory positions normally require graduate degrees.

A number of government agencies traditionally hire biology graduates including Environment Canada, Provincial Environmental Ministries, Federal and Provincial Forestry, Health and Welfare, Fisheries, and Agriculture.

In the private sector, biology graduates have been hired in the pharmaceutical industry, in scientific equipment sales and promotion, in control labs and in environmental consulting firms.

GENERAL INFORMATION

The main office of the Biology Department is open Mon.-Fri. 9 a.m.- 5 p.m. for general questions at the following location:

H-1260 - Hall Building
1455 de Maisonneuve Blvd. W.
Montreal, Quebec
H3G-1M8
Tel: 848-3400 FAX: 848-2881

Faculty members are available for academic advising of students at the department level before registration. Appointments for advice may be made during periods of registration by phoning the above number. Appointments should be made by students who require extensive consultation, particularly new students entering Biology programmes. Students must see an academic advisor before they can complete telephone registration.

	Telephone	Office
Department Chair		
R. M. Roy, Ph.D.	848-3390	S-H-1260-8
Associate Chair, Undergraduate Affairs		
E. Maly, Ph.D.	848-3408	S-H-1225-1
Graduate Programme Director		
N. Kapoor, PhD.	848-3403	S-H-1213-1
Honours Advisor		
J.D. McLaughlin, Ph.D.	848-3409	S-H-1211

FULL-TIME FACULTY

Professors		
P.J. Albert, Ph.D. (New Brunswick)	848-8729	H-1217-2
H.E. Enesco, Ph.D. (Columbia)	848-3396	H-1207-1
R.K. Ibrahim, Ph.D. (McGill)	848-3399	H-1261
E.J. Maly, Ph.D. (Princeton)	848-3408	H-1225-1
E.B. Newman, Ph.D. (Radcliffe)	848-3410	H-1247
R. Sheinin, Ph. D. (Toronto)	848-4898	BC-224
Associate Professors		
P.D. Anderson, Ph.D. (Oregon State)	848-3391	K-307 (2150 MacKay)
C. Beckman, Ph.D. (Rutgers)	848-3393	H-1237-1
R.T. Cronin, Ph.D. (Fordham)	848-3394	H-601
K.S. Dhindsa, Ph.D. (Helsinki)	848-3395	H-1245-1
D.J. Fairbairn, Ph.D. (British Columbia)	848-3397	H-1219-1
L.-A. Giraldeau, Ph. D. (McGill)	848-3425	H-1237-21
M.B. Herrington, Ph.D. (McMaster)	848-3398	H-1255
N.N. Kapoor, Ph.D. (McMaster)	848-3403	H-1213-1
B.S. Mangat, Ph.D. (London)	848-3406	H-1280-2
J.D. McLaughlin, Ph.D. (New Brunswick)	848-3409	H-1211-1
R.M. Roy, Ph.D. (Toronto)	848-3390	H-1260-8
S.M. Ruby, Ph.D. (Western)	848-3400	TBA
R.K. Storms, Ph.D. (Alberta)	848-3412	H-1253-5
A. Tsang, Ph.D. (York)	848-3405	H-1259-1
P. Widden, Ph.D. (Calgary)	848-3413	H-1209-1
Assistant Professors		
C.G. Cupples, Ph.D. (York)	848-3427	H-1255-3
J.W.A. Grant, Ph.D. (Guelph)	848-3421	H-1255-5
P.J. Gulick, Ph.D. (U.C. Davis)	848-3407	H-1253-1
J.A. Kornblatt, Ph.D. (Cincinnati)	848-3404	H-1206

PROGRAMMES & COURSES

The Biology Department offers a wide variety of courses in plant biology, animal biology, ecology and cell and molecular biology. Programmes are designed to give the student a broad background in the biological sciences and to allow specialization and diversification according to the interests of the individual student. The programmes are highly flexible and require guidance from faculty advisors so that students can take full advantage of the range of options available.

Although the Biology Department offers Honours, Specialization, Major and Minor programmes, we recommend that students wishing to pursue careers in Biology take either an Honours or Specialization programme in Biology, Cell and Molecular Biology, or Ecology. Entry into the Honours programme usually occurs after completion of 30 credits. The Major and Minor programmes are not designed to provide an extensive enough background in Biology for students to progress to careers in the discipline. The Major should be considered by students requiring a less specialized degree, with a Biology concentration, or as part of a double-major programme. The minor is designed to be flexible and allow a student whose area of concentration is outside of Biology to take courses to provide either a general survey or to gain a more in-depth understanding of one of the major areas of Biology.

COURSE NUMBERING

Normally all courses with CEGEP prerequisites or no prerequisites will be 200-level, and most commonly are taken by students in first year (within 30 credits), or as electives in later years. Those courses with 200-level prerequisites will be 300-level, and normally are taken by students in second or third year. Likewise those courses with 300-level prerequisites and/or 400-level co-requisites will be 400-level. Prerequisites to courses can only be waived by obtaining the written permission of the instructor, Chair or Associate Chair prior to registration. Students in first year may take 300-level courses provided they have the prerequisites.

COURSE GROUPINGS (subject areas)

These course Groups (A-E) apply only to students enrolled in the department before 1994. NEWLY ADMITTED STUDENTS WILL NOT NEED TO ADHERE TO RULES INVOLVING THESE GROUPS. In programmes prior to 1994-95, Biology 490 will be considered to be Group A, B, C or D depending upon the project undertaken by the student.

ANIMAL BIOLOGY COURSES (Group A)

230 - Animal Biology (not given after 1994-95)
232 - Entomology I (BIOL 385 after 1995)
233 - Entomology II (BIOL 386 after 1995)
331 - Comparative Vertebrate Anatomy
332 - Parasitology
334 - Vertebrate Embryology
335 - Histology I
336 - Histology II
337 - Invertebrate Zoology I
338 - Invertebrate Zoology II
383 - Animal Physiology I
384 - Animal Physiology II
431 - Biology of Fishes
432 - Comparative and Environmental Physiology

BOTANY COURSES (Group B)

240 - Plant Biology (not given after 1994-95)
344 - Biology of Algae
346 - Physiology of Plant Development
347 - Plant Anatomy
349 - Plant Nutrition and Metabolism
352 - Plant Field Ecology
398C - Intermediate Topics - Plant Interactions with Other Organisms
441 - Plant Biochemistry
442 - Perspectives in Plant Tissue Culture and Biotechnology
498B - Advanced Topics - Plant Responses to Stress
498X - Advanced Topics - Plant Molecular Genetics

ECOLOGY and BEHAVIOR COURSES (Group C)

250 - Fundamentals of Ecology (not given after 1994-95)
352 - Plant Field Ecology
355 - Fundamentals of Limnology
356 - Microbial Ecology
358 - Introduction to Animal Behaviour
359 - Evolutionary Ecology
381 - Biology of Pollutants
398A - Intermediate Topics - Intermediate Concepts in Ecology
452 - Ecological Genetics
453 - Behavioural Ecology and Sociobiology
454 - Population Ecology
456 - Current Advances in Ecological Research

CELL AND MOLECULAR BIOLOGY COURSES (Group D)

261 - Molecular and General Genetics
270 - Introductory Microbiology (not given after 1994-95)
266 - Cell Biology
364 - Cell Physiology
363 - Cytogenetics
366 - Mechanisms of Development
367 - Molecular Biology
368 - Genetics and Cell Biology Laboratory
370 - Intermediate Microbiology
461 - Advanced Genetics
462 - Immunology
463 - Developmental Biology
464 - Advanced Cell Physiology
465 - Biological Regulatory Mechanisms
466 - Advanced Molecular Biology Laboratory
468 - Gene Structure
469 - DNA Repair
470 - Microbial Physiology
498A - Advanced Topics - Biochemistry and Genetics of Disease
498V - Advanced Topics - Mechanisms of Protein Synthesis
498X - Advanced Topics - Plant Molecular Genetics

BIOLOGY ELECTIVE COURSES (Group E)

320 - History of Biology
321 - Evolution
322 - Biostatistics*
323 - Biology of Aging
380 - Nutrition
420 - Radiation Biology and Radiotracer Methodology
482 - Intermediate Statistics
490 - Independent Study

plus all courses listed under Animal Biology, Botany, Ecology and Behaviour and Cell and Molecular Biology as well as any of the BIOL 298/299, 398/399 or 498/499 series.

* Biostatistics is required in some programmes; in such cases, it will not count as a Biology Group E elective course.

BIOLOGY COURSES NOT AVAILABLE FOR CREDIT TO STUDENTS IN BIOLOGY PROGRAMMES

The following courses are intended to be taken as electives in non-biology programmes:

200 - Fundamentals of Human Biology
201 - Introductory Biology
203 - Fundamental Nutrition
206 - Elementary Genetics
207 - Microorganisms and Man
208 - Environmental Biology
210 - Genetics and Human Welfare

SLOT COURSES - BIOL 298/9, 398/9 and 498/9

Special Topics in Biology (BIOL 298 or 299), Intermediate Topics in Biology (BIOL 398 or 399) and Advanced Topics in Biology (Biol 498 or 499) are scheduled annually and provide the opportunity for further study in various areas of concentration. The course numbers and Special Topics, as well as prerequisites are described in the Annual Undergraduate Class Schedule. Each is identified by a 3-digit number plus a letter A to Z. For example, BIOL 298D: Selected Topics in Biology (Special Topic: Biology of Organisms I).

UNDERGRADUATE PROGRAMMES

The Biology Department is introducing new and modified courses and programmes in 1994-95. Students who entered in the 1993-94 academic year will be able to complete existing programmes; however, entering students and those with less than 30 credits completed are strongly encouraged to transfer to one of the new programmes. To facilitate transfer, the pre-94 and the new programmes are described below. Although there are many common courses in both new and old programmes, there are some new required core courses which must be taken if one wishes to complete the new programmes. All new programmes have similar core course requirements which allow students to transfer among programmes with minimal disruption to their completion of degree requirements.

Two new core courses are scheduled in 1994-95 under "slot course" numbers (BIOL 298D Biology of Organisms I; and Biol 298E Biology of Organisms II). In 1995-96: these will be presented under permanent course numbers: BIOL 225: Biology of Organisms I and BIOL 226; Biology of Organisms II. In addition, BIOL 227, Laboratory Studies of Organisms will be offered for the first time in the Fall of 1995. These courses replace BIOL 230 (Animal Biology), BIOL 240 (Plant Biology), BIOL 250 (Fundamentals of Ecology) and BIOL 270 (Microbiology).

Prior to 1994-95, the Department offerred a 72-credit Honours, 60-credit Specialization, 42-credit Major and 24-credit Minor programmes. Beginning in 1994-95, two new honours programmes and two new specialization programmes have been added: a 72-credit Honours and a 66-credit Specialization in Cell and Molecular Biology, as well as a 72-credit Honours and a 60-credit Specialization in Ecology.

The pre-1994 programmes and the new programmes are listed below:

Programmes generally followed by students entering the department before 1994.

72-credit *Pre-'94* Honours in Biology

33 credits

Organic Chemistry I[3]
Organic Chemistry II[3]
Biochemistry[3]
Genetics[3]
Animal Biology[3]
Plant Biology[3]
Fundamentals of Ecology[3]
Introductory Microbiology[3]
Biostatistics[3]
Independent Study[6]

6 credits from:

Animal Physiology[6]
Physiology of Plant Development[3]
Plant Nutrition and Metabolism[3]
Cell Physiology[3]
Advanced Cell Physiology[3]

33 credits from:

A: Animal Biology Group
B: Plant Biology Group
C: Ecology Group
D: Cell and Molecular Group
E: Biology Elective Group

No more than 9 Biology elective credits may be taken from Group E and a minimum of 21 credits in 300- and 400-level courses must be completed (excluding BIOL 490)

Students interested in Cell and Molecular Biology normally take Cell Physiology and Advanced Cell Physiology, and concentrate electives in Group D, as well as in Biochemistry elective courses as described in the new programme.

Students interested in Ecology normally select courses from Group C courses and related areas in group A and group B as described in the new programme.

Programmes generally followed by students entering the department before 1994.

60-Credit *Pre-'94* Specialization in Biology

27 credits:

Organic Chemistry I[3]
Organic Chemistry II[3]
Biochemistry[3]
Genetics[3]
Animal Biology[3]
Plant Biology[3]
Fundamentals of Ecology[3]
Introductory Microbiology[3]
Biostatistics[3]

6 credits from:

Animal Physiology[6]
Physiology of Plant Development[3]
Plant Nutrition and Metabolism[3]
Cell Physiology[3]
Advanced Cell Physiology[3]

27 credits from:

A: Animal Biology Group
B: Plant Biology Group
C: Ecology Group
D: Cell and Molecular Group
E: Biology Elective Group

No more than 9 credits may be taken from Group E and a minimum of 15 credits in 300- and 400-level courses must be completed (excluding BIOL 490).

Students interested in Cell and Molecular Biology normally select Cell Physiology and Advanced Cell Physiology, and concentrate electives in Group D courses and Biochemistry elective courses as described in the new programme.

Students interested in Ecology normally select courses Group C courses and related areas in Group A and Group B as described in the new programme.

Programmes generally followed by students entering the department before 1994.

42-Credit *Pre-'94* Major in Biology

21 credits

Organic Chemistry I[3]
Organic Chemistry II[3]
Biochemistry[3]
Genetics[3]
Animal Biology[3]
Plant Biology[3]
Fundamentals of Ecology[3]

3 credits from:

Biostatistics[3]
Animal Physiology[6]
Physiology of Plant Development[3]
Plant Nutrition and Metabolism[3]
Cell Physiology[3]
Advanced Cell Physiology[3]

18 credits from:

A: Animal Biology Group
B: Plant Biology Group
C: Ecology Group
D: Cell and Molecular Group
E: Biology Elective Group

No more than 6 credits may be taken from Group E and a minimum of 6 credits in 300- and 400-level courses must be completed.

24-Credit *Pre-'94* Minor in Biology

12 credits; i.e., 3 credits from each:

Animal Biology courses[3]
Plant Biology courses[3]
Ecology courses[3]
Microbiology courses[3]

12 credits:

Additional Biology courses.

The following programmes are recommended for students entering the department in Spring of 1994 or later. Note that Animal Biology, Plant Biology, Ecology, and Microbiology will not be offered after the 1994-95 academic year; the choice between Biology of Organisms I, II and Laboratory Studies of Organisms versus 9 credits chosen from Animal Biology, Plant Biology, Ecology and Microbiology will not be available after the 1994-95 academic year.

72-credit Honours in Biology

24 credits
- Organic Chemistry I[3]
- Organic Chemistry II[3]
- Biochemistry[3]
- Molecular and General Genetics[3]
- Cell Biology[3]
- Molecular Biology[3]
- Independent Study[6]

9 credits
- Biology of Organisms I[3]
- Biology of Organisms II[3]
- Laboratory Studies of Organisms[3]

OR

9 credits from:
- Animal Biology[3]
- Plant Biology [3]
- Fundamentals of Ecology[3]
- Introductory Microbiology[3]

3 credits from:
- Biostatistics[3]
- Analytical Chemistry[3]

3 credits from:
- Animal Physiology I[3]
- Animal Physiology II[3]
- Physiology of Plant Development[3]
- Plant Nutrition and Metabolism[3]
- Cell Physiology[3]

33 credits from:
Biology courses selected freely with a minimum of 12 credits at 300-level and 9 credits at 400-level. Students may wish to concentrate these electives to follow a concentration in Animal Biology, Plant Biology, Environmental Biology or Microbiology and Biotechnology (p. 17-20).

60-credit Specialization in Biology

18 credits
- Organic Chemistry I[3]
- Organic Chemistry II[3]
- Biochemistry[3]
- Molecular and General Genetics[3]
- Cell Biology[3]
- Molecular Biology[3]

9 credits
- Biology of Organisms I[3]
- Biology of Organisms II[3]
- Laboratory Studies of Organisms[3]

OR

9 credits from:
- Animal Biology[3]
- Plant Biology [3]
- Fundamentals of Ecology[3]
- Introductory Microbiology[3]

3 credits from:
- Biostatistics[3]
- Analytical Chemistry[3]

3 credits from:
- Animal Physiology I[3]
- Animal Physiology II[3]
- Physiology of Plant Development[3]
- Plant Nutrition and Metabolism[3]
- Cell Physiology[3]

27 credits from:
Biology courses selected freely with a minimum of 12 credits at 300-level and 6 credits at 400-level. Students may wish to concentrate these electives to follow a concentration in Animal Biology, Plant Biology, Environmental Biology or Microbiology and Biotechnology (p. 17-20).

45-Credit Major in Biology

18 credits
- Organic Chemistry I[3]
- Organic Chemistry II[3]
- Biochemistry[3]
- Molecular and General Genetics[3]
- Cell Biology[3]
- Molecular Biology[3]

9 credits
- Biology of Organisms I[3]
- Biology of Organisms II[3]
- Laboratory Studies of Organisms[3]

OR

9 credits from:
- Animal Biology[3]
- Plant Biology [3]
- Fundamentals of Ecology[3]
- Introductory Microbiology[3]

3 credits from:
- Biostatistics[3]
- Analytical Chemistry[3]

3 credits from:
- Animal Physiology I[3]
- Animal Physiology II[3]
- Physiology of Plant Development[3]
- Plant Nutrition and Metabolism[3]
- Cell Physiology[3]

12 credits from:
Biology courses selected freely with a minimum of 9 credits at 300-level and 3 credits at 400-level.

24-Credit Minor in Biology

12 credits from:
- Animal Biology[3]
- Plant Biology
- Ecology[3]
- Molecular and General Genetics[3]
- Cell Biology[3]
- Microbiology[3]

12 credits from:
Additional Biology courses

72-Credit Honours in Cell and Molecular Biology

42 credits

Analytical Chemistry[3]
Organic Chemistry I[3]
Organic Chemistry II[3]
Biochemistry[3]
Molecular and General Genetics[3]
Cell Biology[3]
Molecular Biology[3]
Cell Physiology[3]
Biochemistry II[3]
Genetics and Cell Biology Lab[3]
Advanced Laboratory in Molecular Biology[3]
Advanced Biochemistry Lab[3]
Independent Study[6]

6 credits

Biology of Organisms I[3]
Biology of Organisms II[3]

OR

6 credits from:

Animal Biology[3]
Plant Biology[3]
Fundamentals of Ecology[3]
Introductory Microbiology[3]

9 credits from:

300-level Biology courses

15 credits from:

400-level Biology and Chemistry courses with at least 9 credits in Cell and Molecular courses from the following: Radiation Biology[3], Plant Biochemistry[3], Advanced Genetics[3], Immunology[3], Advanced Cell Physiology[3], Biological Regulatory Mechanisms[3], Gene Structure[3], DNA Repair[3], Microbial Physiology[3], Mechanisms of Protein Synthesis[3], Plant Molecular Genetics[3], Biochemistry and Genetics of Disease[3], and at least 3 credits in 400-level Biochemistry from the following: Enzyme Kinetics and Mechanisms[3], Chemical Toxicology[3], Medicinal Chemistry I[3], Medicinal Chemistry II[3], Hormone Biochemistry[3], Bioinorganic Chemistry[3], Plant Biochemistry

66-credit Specialization in Cell and Molecular Biology

36 credits

Analytical Chemistry[3]
Organic Chemistry I[3]
Organic Chemistry II[3]
Biochemistry[3]
Molecular and General Genetics[3]
Cell Biology[3]
Molecular Biology[3]
Cell Physiology[3]
Biochemistry II[3]
Genetics and Cell Biology Lab[3]
Advanced Laboratory in Molecular Biology[3]
Advanced Biochemistry Lab[3]

6 credits

Biology of Organisms I[3]
Biology of Organisms II[3]

OR

6 credits from:

Animal Biology[3]
Plant Biology[3]
Fundamentals of Ecology[3]
Introductory Microbiology[3]

9 credits from:

300-level Biology courses

15 credits from:

400-level Biology and Chemistry courses with at least 9 credits in Cell and Molecular courses from the following: Radiation Biology[3], Plant Biochemistry[3], Advanced Genetics[3], Immunology[3], Advanced Cell Physiology[3], Biological Regulatory Mechanisms[3], Gene Structure[3], DNA Repair[3], Microbial Physiology[3], Mechanisms of Protein Synthesis[3], Plant Molecular Genetics[3], Biochemistry and Genetics of Disease[3] and at least 3 credits in 400-level Biochemistry from the following: Enzyme Kinetics and Mechanisms[3], Chemical Toxicology[3], Medicinal Chemistry I[3], Medicinal Chemistry II[3], Hormone Biochemistry[3], Bioinorganic Chemistry[3]

72-credit Honours in Ecology

30 credits

Organic Chemistry I[3]
Organic Chemistry II[3]
Biochemistry[3]
Fundamentals of Ecology[3] or Biology of Organisms II[3]
Molecular and General Genetics[3]
Cell Biology[3]
Molecular Biology[3]
Biostatistics[3]
Independent Study[6]

6 credits

Biology of Organisms I[3]
Laboratory Studies of Organisms[3]

OR

6 credits from:

Animal Biology[3]
Plant Biology[3]
Introductory Microbiology[3]

3 credits from:

Animal Physiology I[3]
Animal Physiology II[3]
Physiology of Plant Development[3]
Plant Nutrition and Metabolism[3]
Cell Physiology[3]

33 credits from:

Elective courses in Ecology and related fields with at least 21 credits at 300- and 400- level from the following: Evolution[3], Plant Field Ecology[3], Fundamentals of Limnology[3], Microbial Ecology[3], Introduction to Animal Behaviour[3], Evolutionary Ecology[3], Biology of Pollutants[3], Intermediate Concepts in Ecology[3], Biology of Fishes[3], Ecological Genetics[3], Behavioral Ecology and Sociobiology[3], Population Ecology[3], Current Advances in Ecological Research[3]

60-credit Specialization in Ecology

24 credits

Organic Chemistry I[3]
Organic Chemistry II[3]
Biochemistry[3]
Fundamentals of Ecology[3] or Biology of Organisms II[3]
Molecular and General Genetics[3]
Cell Biology[3]
Molecular Biology[3]
Biostatistics[3]

6 credits from:

Biology of Organisms I[3]
Laboratory Studies of Organisms[3]

OR

6 credits from:

Animal Biology[3]
Plant Biology[3]
Microbiology[3]

3 credits from:

Animal Physiology I[3]
Animal Physiology II[3]
Physiology of Plant Development[3]
Plant Nutrition and Metabolism[3]
Cell Physiology[3]

27 credits from:

Elective credits in Ecology and related fields with at least 18 credits at 300- or 400-level from the following: Evolution[3], Plant Field Ecology[3], Fundamentals of Limnology[3], Microbial Ecology[3], Introduction to Animal Behaviour[3], Evolutionary Ecology[3], Biology of Pollutants[3], Intermediate Concepts in Ecology[3], Biology of Fishes[3], Ecological Genetics[3], Behavioral Ecology and Sociobiology[3], Population Ecology[3], Current Advances in Ecological Research[3]

SELECTING COURSES

Students must consult a faculty advisor annually and should plan ahead at least one year. It is important that students be aware of the prerequisite courses that are required by advanced-level courses. For example, Biology 453/4 requires BIOL 358 which in turn requires BIOL 250. It is not possible to take all three of these courses in one academic year. In some cases a student may have to take a prerequisite course in the first year in order to take a desired course in the third year because of other prerequisite courses. So planning is necessary to assure an adequate background to allow entry to the required number of 300- and 400- level courses. In exceptional circumstances, prerequisites may be waived by written permission of course instructors.

Students should not assume that all courses will be presented each year. Some of our elective courses may not appear in a given year. This does not apply to required courses; these are normally scheduled twice annually. Students are free to select courses in day or evening division. Many day students find the availability of evening courses an advantage in arranging their schedule.

In addition to specializing in either Cell and Molecular Biology or Ecology, students registered in Honours or Specialization programmes in Biology may concentrate their studies in Animal Biology, Plant Biology, Environmental Biology or Microbiology and Biotechnology. It is also possible to select courses in preparation for admission to professional programmes in the Health Sciences. The following paragraphs contain suggestions for sequences of core courses for the different concentrations.

Recommended Course Sequences

Students are advised to try to complete the following core courses in the first year of their programme in order to meet prerequisite requirements for subsequent years in all programmes.

Organic Chemistry I (CHEM 221[3])
Organic Chemistry II (CHEM 222[3])
Biology of Organisms I (BIOL 298D[3]) or Plant Biology (BIOL 240[3]) and Animal Biology (BIOL 230[3])
Biology of Organisms II (BIOL 298E[3]) or Fundamentals of Ecology (BIOL 250[3])
Molecular and General Genetics (BIOL 261[3])
Cell Biology (BIOL 266[3])
Biochemistry (CHEM 271[3])

Analytical Chemistry for Biologists (CHEM 212[3]) should be taken by those in Cell and Molecular Biology Programmes.

The following course sequences indicate required courses, recommended Biology electives and suitable complementary electives in other departments.

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PROGRAMMES IN CELL AND MOLECULAR BIOLOGY

Core Courses:

Year I: 200-level courses
Analytical Chemistry for Biologists (CHEM 212)[3]

Year II: Cell Physiology (364)[3]
Molecular Biology (367)[3]
Genetics and Cell Biology Lab (368)[3]
Biochemistry II (CHEM 375)[3]

Year III: Advanced Biochemistry Lab (CHEM 479)[3]
Advanced Molecular Biology Lab (466)[3]

Cell and Molecular Biology and Biochemistry Electives:

Year II-III:

Cytogenetics (363)[3]
Radiation Biol. and Radiotracer Meth. (420)[3]
Plant Biochemistry (441)[3]
Advanced Genetics (461)[3]
Immunology (462)[3]
Advanced Cell Physiology (464)[3]
Biological Regulatory Mechanisms (465)[3]
Gene Structure (468)[3]
DNA Repair (469)[3]
Microbial Physiology (470)[3]
Biochemistry and Genetics of Disease (498A)[3]
Mechanisms of Protein Synthesis (498V)[3]
Plant Molecular Genetics (498X)[3]
Enzyme Kinetics and Mechanics (CHEM 471)[3]
Chemical Toxicology (CHEM 472)[3]
Medicinal Chemistry I (CHEM 473)[3] (not offered '94-'95)
Medicinal Chemistry II (CHEM 474)[3] (not offered '94-'95)
Hormone Biochemistry (CHEM 478)[3]
Bio-organic Chemistry (Chem 481)[3]

Related Courses in Biology:

Biostatistics (BIOL 322)[3]
Plant Growth and Development (346)[3]
Plant Nutrition and Metabolism (349)[3]
Mechanisms of Development (366)[3]
Intermediate Microbiology (370)[3]
Animal Physiology I (383)[3]
Animal Physiology II (384)[3]

PROGRAMMES IN ECOLOGY

Core Courses:

Year I: 200-level core courses
Fundamentals of Ecology (250)[3] or Biology of Organisms II (298E)[3]

Year II: Biostatistics (322)[3]
Laboratory Studies of Organisms (227)[3] for those who have not completed 6 credits from Animal Biology (230)[3], Plant Biology (240)[3] and Introductory Microbiology (270)[3]

3 credits from:
Animal Physiology I (383)[3] and II (384)[3]
Physiology of Plant Development (346)[3]
Plant Nutrition and Metabolism (349)[3]
Cell Physiology (364)[3]

Ecology Electives:

Year II-III:
Plant Field Ecology (352)[3]
Fundamentals of Limnology (355)[3]
Microbial Ecology (356)[3]
Introduction to Animal Behaviour (358)[3]
Evolutionary Ecology (359)[3]
Intermediate Concepts in Ecology (398A)[3]
Ecological Genetics (452)[3]
Behavioral Ecology & Sociobiology (453)[3]
Population Ecology (454)[3]
Current Adv. in Ecological Research (456)[3]

Courses in Related Areas of Biology:

Entomology I (232)[3]
Entomology II (233)[3]
Invertebrate Zoology I (337)[3]
Invertebrate Zoology II (338)[3]
Parasitology (332)[3]
Biology of Algae (344)[3]
Biology of Pollutants (381)[3]
Biology of Fishes (434)[3]
Comparative and Environmental Physiology (432)[3]
Intermetidate Statistics (482)[3]

Elective Courses* Outside the Department:

Oceanography (GEOL 202)[3]
Intro. Environmental Geology (GEOL 203)[3]
Habitat and Society (GEOG 202)[3]
Natural Environment (GEOG 271)[3]
The Sea (GEOG 273)[3]
Climate and the Biosphere (GEOG 275)[3]
Landforms and the Bioshphere (GEOG 276)[3]
Tropical Rain Forests (GEOG 371)[6]
Analysis of the Environment (GEOG 372)[6]
Climatology (GEOG 373)[6]

*In some instances, students may be granted permission to use these as Biology electives.

BIOLOGY PROGRAMMES WITH CONCENTRATION IN ANIMAL BIOLOGY

Core Courses:

Year I: 200-level core courses

Year II: Animal Physiology I (383)[3] and II (384)[3]
Biostatistics (322)[3]
Molecular Biology (367)[3]
Laboratory Studies of Organisms (227)[3] for those who have not taken 9 credits from Animal Biology (230)[3], Plant Biology (240)[3], Fundamentals of Ecology (250)[3] and Introductory Microbiology (270)[3]

Animal Biology Electives:

Year II-III:

Entomology I (232)[3]
Entomology II (233)[3]
Comparative Vertebrate Anatomy (330)[6]
Parasitology (332)[3]
Vertebrate Embryology (334)[3]
Histology I (335)[3]
Histology II (336)[3]
Invertebrate Zoology I (337)[3]
Invertebrate Zoology II (338)[3]
Biology of Fishes (431)[3]
Comparative Environmental Physiology (432)[3]
Advanced Parasitology (436)[3]

Courses in Related Areas of Biology:

Evolution (321)[3]
Introductory Animal Behaviour (358)[3]
Cell Physiology (364)[3]
Genetics and Cell Biology Laboratory (368)[3]
Behaviourial Ecology and Sociobiology (453)[3]

Elective Courses* Outside Department:

Fundamentals of Behavioral Neurobiology (PSYC 358)[3]
Neuropsychology (PSYC 359)[3]
Psychology of Drug Dependence (PSYC 361)[3]
Psychobiology of Learning and Memory (PSYC 362)[3]
Introduction to Behavioral Medicine (PSYC 364)[3]
Psychobiology of Sensation and Perception (PSYC 365)[3]
Animal Behaviour (PSYC 366)[6]
Psychobiology of Motivated Behavior (PSYC 367)[3]
Hormones and Behaviour (PSYC 369)[3]

* In some instances, students may be granted permission to use these as Biology electives.

BIOLOGY PROGRAMMES WITH CONCENTRATION IN PLANT BIOLOGY

Core Courses:

Year I: 200-level core courses

Year II: Physiology of Plant Development (346)[3]
Plant Nutrition and Metabolism (349)[3]
Biostatistics (322)[3]
Molecular Biology (367)[3]
Laboratory Studies of Organisms (227)[3] for those who have not completed 9 credits from Animal Biology (230)[3], Plant Biology (240)[3], Fundamentals of Ecology (250)[3] and Introductory Microbiology (270)[3]

Biology Electives:

Year II-III:

Biology of Algae (344)[3]
Plant Anatomy (347)[3]
Plant Interactions with Other Organisms (398C)[3]
Perspect. Plant Tissue Culture & Biotech. (442)[3]
Plant Field Ecology (352)[3]
Microbial Ecology (356)[3]
Plant Biochemistry (441)[3]
Plant Molecular Genetics (498X)[3]
Plant Responses to Stress (498Y)[3]

Related Courses in Biology:

Cytogenetics (363)[3]
Cell Physiology (364)[3]
Genetics and Cell Biology Laboratory (368)[3]

Elective Courses* Outside the Department:

Analytical Chemistry for Biologists (CHEM 212)[3]
Natural Products (CHEM 326)[3]
Intermediary Metabolism (CHEM 375)[3]
Habitat and Society (GEOG 202)[3]
Natural Environment (GEOG 271)[3]
Landforms and the Bioshphere (GEOG 276)[3]
Tropical Rain Forests (GEOG 371)[6]
Analysis of the Environment (GEOG 372)[6]

*In some instances, students may be granted permission to use these as Biology electives.

BIOLOGY PROGRAMMES WITH CONCENTRATION IN ENVIRONMENTAL BIOLOGY

Core Courses:

Year I: 200-level core courses
Analytical Chemistry for Biologists (Chem 212[3])

Year II: Biostatistics (322)[3]
Plant Nutrition and Metabolism (349)[3]
Molecular Biology (367)[3]
Animal Physiology I (383)[3] and II (384)[3]
Laboratory Studies of Organisms (227)[3] for those who have not completed 9 credits from Animal Biology (230)[3], Plant Biology (240)[3], Fundamentals of Ecology (250)[3] and Introductory Microbiology (270)[3]

Environmental Biology Electives:

Year II-III:

Invertebrate Zoology I (234)[3]
Invertebrate Zoology II (235)[3]
Biology of Algae (344)[3]
Fundamentals of Limnology (355)[3]
Microbial Ecology (356)[3]
Evolutionary Ecology (359)[3]
Cell Physiology (364)[3]
Intermediate Microbiology (370)[3]
Biology of Pollutants (381)[3]
Intermediate Concepts in Ecology (398A)[3]
Plant Interactions with other Organisms (398C)[3]
Radiation Biology and Radiotracer Meth. (420)[3]
Biology of Fishes (431)[3]
Comparative and Environmental Physiology (432)[3]
Population Ecology (454)[3]
Current Advances in Ecological Research (456)[3]
Intermediate Statistics (482)[3]
Plant Responses to Stress (498B)[3]

Elective Courses* Outside Department:

Biochemistry II (CHEM 375)[3]
Chemical Toxicology (CHEM 472)[3]
Habitat and Society (GEOG 202)[3]
Introduction to Human Geography (GEOG 211)[3]
The Natural Environment (GEOG 271)[6]
The Sea (GEOG 273)[6]
Climate and Biosphere (GEOG 275)[3]
Land Form and the Bioshphere (GEOG 276)[3]
Biogeography (GEOG 371)[6]
Analysis of Environment (GEOG 372)[6]
Oceanography (GEOL 202)[3]
Introduction to Environmental Geology (GEOL 203)[3]
Intro.to Science and Human Affairs I (SCHA 250)[3]
Intro.to Science and Human Affairs II (SCHA 251)[3]
Environmental Issues I (SCHA 253)[3]
Environmental Issues II (SCHA 254)[3]
Science and Public Policy (SCHA 453)[6]

*In some instances, students may be granted permission to use these as Biology electives.

BIOLOGY PROGRAMMES WITH CONCENTRATION IN MICROBIOLOGY AND BIOTECHNOLOGY

Core Courses:

Year I: 200-level core courses
Analytical Chemistry for Biologists (CHEM 212)[3]

Year II: Cell Physiology (364)[3]
Molecular Biology (367)[3]
Genetics and Cell Biology Laboratory (368)[3]
Intermediate Microbiology (370)[3]

Year III: Advanced Laboratory in Molecular Biology (466)[3]
Microbial Physiology (470)[3]

Biology Electives:

Year II and III:

Plant Nutrition and Metabolism (346)[3]
Plant Growth and Development (349)[3]
Cytogenetics (363)[3]
Plant Biochemistry (441)[3]
Perspectives in Plant Tissue Culture and Plant Biotechnology (442)[3]
Advanced Genetics (461)[3]
Immunology (462)[3]
Advanced Cell Physiology (464)[3]
Regulatory Mechanisms (465)[3]
Gene Structure (468)[3]
DNA Repair (469)[3]
Mechanisms of Protein Synthesis (498V)[3]
Plant Molecular Genetics (498X)[3]

Elective Courses* Outside the Department:

Biochemistry II (CHEM 375)[3]
Enzyme Kinetics and Mechanisms (CHEM 471)[3]
Advanced Biochemistry Laboratory (CHEM 479)[3]

*In some instances, students may be granted permission to use these as Biology electives.

BIOLOGY PROGRAMMES WITH CONCENTRATION IN PRE-PROFESSIONAL HEALTH SCIENCES

Core Courses:

Year I: 200-level core courses

Year II: Animal Physiology I (383)[3] and II (384)[3]
Cell Physiology (364)[3]
Biostatistics (322)[3]
Molecular Biology (367)[3]

Biology Electives:

Year II-III:

Biology of Aging (323)[3]
Comparative Vertebrate Anatomy (331)[6]
Parasitology (332)[3]
Vertebrate Embryology (334)[3]
Histology I (335)[3]
Histology II (336)[3]
Cytogenetics (363)[3]
Genetics and Cell Biology Lab (368)[3]
Intermediate Microbiology (370)[3]
Nutrition (380)[3]
Radiation Biol. Radiotracer Meth. (420)[3]
Immunology (462)[3]
Developmental Biology (463)[3]
Advanced Cell Physiology (464)[3]
Cytogenetics (363)[3]
DNA Repair (469)[3]

Elective Courses* Outside the Department:

Biochemistry II (CHEM 375)[3]
Enzyme Kinetics and Mechanisms (CHEM 471)[3]
Chemical Toxicology (CHEM 472)[3]
Medicinal Chemistry I (CHEM 473)[3] (not offered in 1994 - 95)
Medicinal Chemistry II (CHEM 474)[3] (not offered in 1994 - 95)
Hormone Biochemistry (CHEM 478)[3]
Introduction to Psychology (PSYC 200)[6]
Research Methods in Exper. Psychology I (PSYC 310)
Developmental Psychology (PSYC 330)[6]
Psychology of Drug Dependence (PSYC 361)[3]
Introduction to Behaviourial Medicine (PSYC 364)[3]
Psychobiology of Sensation and Perception (PSYC 365)[3]
Hormones and Behaviour (PSYC 369)[3]

*In some instances, students may be granted permission to use these as Biology electives.

GENERAL REQUIREMENTS

General Education Electives

The B.Sc. in Biology, Cell and Molecular Biology, or Ecology currently requires successful completion of a minimum of 90 credits in an approved sequence of courses in either a 45-credit Major, 60-66 credit Specialization or 72-credit Honours Programme. The balance of credits may be taken in cognate areas or any area that meets the interests or career objectives of the individual student. The Biology Department, as a unit of the Faculty of Arts and Science, is committed to a balance between specialized and general education. Students must complete a minimum of 24 credits outside the single discipline or department from which the degree concentration has been chosen. Within every block of 30 credits (usual course load for 2 terms of full-time study), a Biology student will normally choose no more than 24 credits in Biology. In the case of Biology programmes, all courses presented by other departments (even with some Biology content) qualify as being outside the discipline. For example, Organic Chemistry, Biochemistry, Pharmacology, Medicinal Chemistry or Physiological Psychology qualify as electives which will satisfy general education requirements. Under some circumstances students may be allowed to take such courses in place of Biology electives.

Language Proficiency

All students entering bachelor's degree programmes must give proof of acceptable writing skills as a condition of graduation. The only exceptions are those already tested prior to admission (Concordia English Language Diagnostic Test, Test of English as a Foreign Language or University of Michigan English Language Test). The graduation requirement must be met either by passing the University Writing Test (UWT) or by obtaining a specific grade in a designated language course: ENGL 212 or FRAN 400. The UWT is a short composition in English or French on the student's choice of one of several topics. The test is offered several times a year and may be taken as often as necessary. Students are not charged a fee and unsuccessful attempts do not appear on a student's record. Students are encouraged to take the UWT as soon as possible in case a remedial course is required.

The language of instruction in Biology at Concordia is English but assignments and examinations may be submitted in French. The language proficiency requirement may be satisfied in either English or French.

Performance Regulations

All students are required to achieve an acceptable standard of scholarship. Academic Standing is determined on the basis of an Annual Grade Point Average (WPGA) described in section 16.3.10 of the undergraduate calendar. In the Faculty of Arts and Science, a student must maintain an Annual WGPA of at least 2.00 ("C" average). Students with Annual WGPA of less than 2.00 but at least 1.50 are put on Conditional Standing. A student is not permitted to obtain two consecutive Conditional Standing Assessments. See section 31.0031 of the undergraduate calendar for further details. In addition to the general performance requirements, students in the Honours degree programme must maintain an average of "B" in all courses in the programme and the minimum grade in any one of these courses is "C". An Honours student must have a minimum average of "B-" in the programme in each year. In courses outside the programme, the student must have an average of no less than "C" and the minimum acceptable grade is "D".

Colleges

The Faculty of Arts and Science provides opportunities for study in smaller academic units. There are currently 5 Colleges in operation, two of which are available to students in Biology programmes: Science College and Simone de Beauvoir Institute. Each unit is composed of a group of students and Fellows (professors) who are united by a particular philosophy of education. Each unit has a physical location of its own, where its students may gather to exchange ideas, whether in the classroom or in one of the lounges provided for such interaction.

Refer to section 31.550 of the undergraduate calendar for a description of the Science College and its 30-credit curriculum which may be taken in combination with the regular Biology Majors, Specialization or Honours programmes. The description of the Simone de Beauvoir Institute is found in section 31.550 of the undergraduate calendar. Students admitted to the Institute must complete 9 credits in Women's Studies courses.

HELPFUL HINTS

Course exemptions can be obtained at the time of admission or during the programme for certain courses taken at CEGEP or at other institutions. Discuss this with the admissions office when applying. Students may be granted permission to complete approved courses at other institutions when equivalent courses are unavailable at Concordia. Requests for permission to take courses at other institutions, or electives in other departments for bioelective credit, course overloads or exemptions from normal requirements may be made to the Department Assoc. Chair, Student Affairs.

Normally students will complete no more than 30 credits in the Fall-Winter semester and no more than 12 credits in Summer. One should make every effort to take approximately 15 credits per semester and balance the number of courses with labs between semesters. Four lab course periods per week in one semester is an extremely demanding commitment, not only in terms of the lab time, but also the preparation and subsequent writing of lab reports.

JANUARY ADMISSIONS

January admissions allow students to begin their programme in January. Although some introductory courses are only available in the first semester, there are usually a significant number of courses available in the second semester and in the summer day and evening division to allow students to complete the first year (30 credits) by the following September.

BIOLOGY 200 - FUNDAMENTALS OF HUMAN BIOLOGY

(6 credits) - lectures only

Offered fall-winter 1994-95 and 1995-96.

Instructor T.B.A.

Description The course discusses life processes in a non-technical manner, employing lectures, demonstrations, audio-visual presentations and discussions. The course probes problems not only of organization and functions, but also of health and disease. The fertilized cell is independently capable of developing all the inter-dependent systems of the adult, requiring only food and protection from outside itself.

These systems are considered at various levels: a) the working unit b) the support unit c) the control unit d) the defense unit e) the hereditary unit.

The senses - the windows of the mind, and the brain centers - for storage and retrieval of sensory data, serve as the basis for intellectual activities.

Each of us can apply the principles, outlined in the course, along the lines of our own interests. Generally, the course should prove useful for those engaged in psychological, sociological, political or economic studies.

Assignments & Grading To be arranged with the participants in the course.

Prerequisite None

Note: Students who have taken CEGEP 921/931 may not take this course for credit.

BIOLOGY 201 - GENERAL BIOLOGY

(3 credits) - lectures and laboratory

Offered in each of the summer, fall and winter semesters, 1994-95 & 1995-96.

Instructor R. Cronin

Description This survey course introduces the basic principles of biology, the science and of organisms, their structures, functions and associations. Beginning with the basic chemistry of life in the cell, with its organization and control, the course proceeds through cell associations in tissues, organs and systems as found in the higher plants and animals. The biology of organisms as individuals and in populations and communities are also considered, as well as their origins, evolution, distribution and diversity. The laboratory, an essential part of the course, introduces the proper use of the microscope and dissection instruments through the study of prepared slide preparations, as well as preserved and living animal plant material.

Assignments & Grading Students are evaluated on lab assignments, term-test and a final examination.

Prerequisite None. This course is equivalent to CEGEP Biol 301.

BIOLOGY 203 - FUNDAMENTAL NUTRITION

(3 credits) - lectures only

Offered fall 1994, winter 1995; 1995-96 T.B.A.

Instructor T. B. A.

Description This course, intended for students not in Biology programmes, deals with the physiological and biochemical role of major nutrients such as protein, carbohydrate and fat as well as that of vitamins and minerals. Sources of, and requirements for, these nutrients will be discussed as well as the concept of energy balance. Modification of nutritional requirements throughout the life cycle (infant nutrition, nutrition for elderly), during athletic training, pregnancy, sickness, weight control programmes and vegetarian dietary regimes are considered.

The development of food habits as well as technology of food preparation and preservation are also described. The main objective of the course is to demonstrate why nutrition is important to maintain good health and how to apply it daily for your particular situation.

Assignments & Grading Students are evaluated on a mid-term and final exam plus an essay.

Prerequisite None

BIOLOGY 206 - ELEMENTARY GENETICS

(3 credits) - lectures only

Offered fall & winter 1994-95 & 1995-96

Instructor C. Beckman

Description This course is intended for non-biology students and consists of a survey of classical and molecular genetics, as well as evolution. Some emphasis is placed upon the application of the science to human examples, although the student should expect to learn a considerable amount about other organisms. Sequence of Information: Monohybrid and other organism crosses - multiple alleles - sex linkage - bacterial genetics - population genetics-evolution - recent developments.

The course content changes each year in order to keep up with new developments.

Assignments & Grading The final grade is based upon two examinations and assignments given during the course.

Prerequisite None

BIOLOGY 207 - MICRO-ORGANISMS AND HUMANITY

(3 credits) - lectures only

Offered fall 1994; 1995-96 T.B.A.

Instructor T. B. A.

Description This course is designed for non-biology students and is intended to provide the student with an elementary understanding of the structure and function of selected viruses, bacteria, protozoa, fungi and algae. The role of these organisms in common human diseases as well as in diseases of agriculturally important plants and animals will be considered. Special problems associated with microorganisms in food production, storage and preservation, will be discussed, in addition to the utilization of microorganisms in the production of pharmaceuticals and vaccines. Industrial uses of micro-organisms, their role in sewage treatment and water pollution will be presented.

Assignments & Grading T.B.A.

Prerequisite None

BIOLOGY 208 - ENVIRONMENTAL BIOLOGY

(3 credits) - lectures only

Offered winter 1995; 1995-96 T.B.A.

Instructor T.B.A.

Description This course, intended for non-Biology students, considers the various components, living and non-living, of natural areas (ecosystems) and their interactions. The effect of humans on these areas will also be considered. The ways in which environmental factors affect the numbers and distribution of different plants and animals will be studied. We will investigate the flow of the energy necessary to maintain life in ecosystems, the cycling of materials necessary for survival (nutrients), as well as the cycling of toxic substances. Some of the properties of communities of different species will be considered. Factors affecting the growth of populations (including the human population) will be discussed.

Assignments & Grading Mid-term test + term paper and final examination.

Prerequisite None

BIOLOGY 210 - GENETICS AND HUMAN WELFARE

(3 credits) - lectures only

Offered winter 1995; 1995-96 T.B.A.

Instructor T. B. A.

Description A course intended for non-Biology students on the principles of heredity as understood by modern biology. It deals also with the application of genetic principles to organisms, including humans. The biological basis of social problems is dealt with at some length. Organic evolution and its implications for human life and welfare are considered.

Assignments & Grading Term test and final examination

Prerequisite None

BIOLOGY 227 - LABORATORY STUDIES OF ORGANISMS

(3 credits) - Laboratory and Tutorial

Offered fall and winter 1995-96

Instructor T. B. A.

Description Laboratory exercises are designed to acquaint students with biodiversity and to introduce methodologies common to studies of organisms and populations. Field trips, dissections, use of taxonomic keys, and basic exercises in physiological function. Use of the microscope, variability within populations, basic techniques in microbiology, and elementary population dynamics. Tutorials include videotapes of plant and animal diversity, history, and behaviour.

Assignments & Grading T.B.A.

Prerequisite BIOl 298D (225) or 298E (226) previously or concurrently

BIOLOGY 230 - ANIMAL BIOLOGY

(3 credits) - lectures and laboratory
Offered fall 1994 (last offering)

Instructor N. Kapoor

Description The course will deal with a basic study of the morphology and physiology of a selected series of invertebrate and vertebrate animals, stressing the diversity among animals and the means by which animal groups meet the environmental demands of the habitat in which they live.

Structure, function, behaviour and integration of organ systems will be studied with emphasis placed on evolutionary trends within the major animal phyla.

Assignments & Grading Lecture material: term test(s) and final exam
Lab material: reports and/or lab practical

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 232 - ENTOMOLOGY I (Becomes BIOL 385 in 1996-97)

(3 credits) - lectures and laboratory
Offered fall 1994; not offered 1995-96.

Instructor P.J. Albert

Description An introduction to the study of insects. Basic physiology. Topics will be discussed as follows:

Introduction: Classification: Protura, Thysaneura, Diplura, Collembola, Embioptera, Plecoptera, Psocoptera, Dermaptera, Ephemeroptera, Orthoptera, Zoraptera, Mallophaga, Anoplura, Thysanoptera, Hemiptera, Homoptera, Coleoptera, Strepsiptera, Mecoptera, Neuroptera, Trichoptera, Lepidoptera, Diptera, Siphonaptera, Hymenoptera.

Morphology: Outer covering, cuticle, external processes of body wall segmentation. Insect head, types, antennae, mouthparts and modifications. Thorax, legs, wings, locomotion. Abdomen, reproductive appendages.
Insect metamorphosis - types. Anatomy: Alimentary canal, excretory and circulatory systems, reproductive and central nervous systems,sensory systems.
Laboratory sessions will deal with morphology, anatomy and classification.
Each student will hand in a collection of 50 different insect species, identified and labelled. Students are advised to begin an insect collection during the summer months.

Assignments & Grading Insect Collections (50 different insects, classified)
Midterm Exam (optional); Lab Exam (Compulsory)
Final Exam (Compulsory);

Prerequisite BIOL 230 or (BIOL 230 or BIOL 298D, 298E, and BIOL 227 previously or concurrently after 1994-95).

BIOLOGY 233 - ENTOMOLOGY II (Becomes BIOl 386 in 1995-96)

(3 credits) - lectures and laboratory
Offered winter 1995; not offered 1995-96

Instructor P.J. Albert

Description This course deals with insect physiology and behaviour. It emphasizes the relationships between structure and function of various insect parts. The lecture topics will include the following: Introduction to insect behaviour, vision, gustation, olfaction, pheromones, hormones, light production, sound production and perception, social behaviour, diapause, migration, and insect control.

Assignments & Grading The final grade will be a combination of marks from the following: midterm test, seminar & final exam.
The values for each of these will be determined at the first lecture.

Prerequisite BIOL 232 (BIOL 232 or 385 after 1994-95)

BIOLOGY 240 - PLANT BIOLOGY

(3 credits) - lectures and laboratory
Offered winter 1995 (last offering)

Instructors B.S. Mangat

Description An introductory lecture and laboratory course designed to acquaint students with the biology of plants. The course emphasizes the following areas:

Structure of the plant cell and its organelles; types of permanent cells and tissues; their distribution and function.

Morphology and modifications of roots, stems, leaves and flowers.

Distribution of tissues in different organs of the plant in relation to the physiological role(s) of each organ.

A study of the physiological processes of plants including water relations, transpiration, respiration, photosynthesis and translocation.

Physiology of plant growth with emphasis on the role of phytohormones in regulating plant growth and development.

Diversity in the plant kingdom as represented by examples from the algae, fungi, bryophytes, ferns and seed plants; their life-cycles and their economic significance.

Assignments & Grading The final grade will be distributed among the following:

Weekly laboratory reports and laboratory quizzes, mid-term exam (or class tests) and final written examination.

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 250 - FUNDAMENTALS OF ECOLOGY

(3 credits) - lectures only
Offered winter 1995 (last offering)

Instructor E. Maly and J. Grant

Description An introduction to the basic principles of ecology. This course illustrates how environmental factors determine distribution and abundance of plants and animals in different ecosystems.

Topics discussed include the abiotic environment (water, air, climate, soil), production and community energetics, community structure, nutrient cycling, single species population characteristics and population regulation, competition, predation. Representative habitats such as forest, tundra, deserts, grasslands, lakes and streams, the ocean coast are studied to illustrate special adaptations. This course serves to introduce the basic concepts in ecology and is prerequisite for most other ecology courses. In addition to teaching basic concepts, the course is designed to outline practical implications of ecology.

Assignments & Grading Mid-term tests, two assignments and final examination.

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 261 - MOLECULAR & GENERAL GENETICS

(3 credits) - lectures and tutorials
Offered fall & winter semesters, 1994-95 & 1995-96

Instructor C. Beckman and P. Gulick

Description A course to illustrate the fundamental principles of inheritance in plants, animals and microorganisms. Mitosis, meiosis, Mendelian genetics, gene linkage, recombination, gene mapping and mutation will be covered. The role of DNA as the hereditary material and genetic code will be studied in detail, as will the mechanisms of DNA, RNA and protein synthesis. There is also an introduction to bacterial genetics and to population genetics.

Assignments & Grading Examinations will test the problem-solving ability of the student with respect to exercises in Mendelian, introductory molecular and population genetics. Regular assignments are required.

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 262 - INTRODUCTORY GENETICS II

Note: This course is no longer available and is replaced by **BIOL 367 - Molecular Biology** in 1994-95.

BIOLOGY 266 - CELL BIOLOGY (FORMERLY BIOL 298C)

(3 credits - lectures only)
Offered fall & winter 1994-95 & 1995-96.

Instructor H. Enesco, M. Herrington and A. Tsang

Description This course is concerned primarily with the principles by which eukaryotic cells function. Discussions of experimental results will form the basis of understanding these principles. Besides an analysis of the structure and function of various cellular compartments, this course will examine the regulatory mechanisms involved in cell division, cell communication, and cellular responses to changes in the environment. Cellular basis of immune functions and behaviour of cancer cells will be discussed.

Assignments & Grading Lecture tests and final exam on lecture material and assigned reading will be used to determine the final grade.

Prerequisite BIOL 261; CHEM 271 previously or concurrently

Please Note Students who have received credit for this topic as Biol 298C may not take this course for credit.

BIOLOGY 270 - INTRODUCTORY MICROBIOLOGY

(3 credits) - lectures and laboratory

Offered fall 1994-95 (last offering)

Instructors M. Herrington

Description An introduction to theoretical and applied aspects of microbiology. The topics covered include the fine structure of the bacterial cell, staining characteristics of microorganisms, kinetics of growth of bacteria, environmental factors affecting bacterial growth, nature and mechanism of action of antibiotics, and structure and reproduction of viruses. In addition, information on the relationships of bacteria and viruses to industry, health, agriculture and ecology is presented.

The laboratory exercises introduce methods of handling microorganisms and will illustrate the lecture material.

Assignments & Grading Final grades will be based on a combination of termpapers, lab reports examinations covering both lecture and laboratory material.

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 298D - SELECTED TOPICS IN BIOLOGY

Subject: Biology of Organisms I

(3 credits) - lectures only

Offered fall & winter, 1994-95; 1995-96

Instructor R. Ibrahim, S. Ruby

Description An introduction to plant and animal form and function is presented. This course provides an overview of basic physiological and morphological aspects of plants and animals that allow survival and reproduction. Topics in animal biology include animal architecture, internal fluids, homeostasis, digestion and nutrition, nervous and chemical coordination; topics in plant biology include plant organization, photosynthesis, respiration, water relations, and growth regulation. Reproduction and development of both plants and animals are introduced.

Assignments & Grading T.B.A.

Prerequisite CEGEP Biology 301 or equivalent

Note: This course will be given as BIOL 225 in 1995-1996.

BIOLOGY 298E - SELECTED TOPIC IN BIOLOGY

Subject: Biology of Organisms II

(3 credits - lectures only)

Offered winter 1995, fall-winter 1995-96.

Instructor J. Grant, E. Maly

Description This course introduces the evolution, biodiversity and ecology of organisms. The origin and diversity of life, from prokaryotes, through simple eukaryotes to multi-cellular organisms, natural selection and speciation, phylogeny, stressing evolutionary relationships in conjunction with changing conditions on earth are presented. The course introduces major concepts in ecology: the physical and chemical environment, population structure, life histories, species interactions, communities, and ecosystems.

Assignments & Grading T.B.A.

Prerequisite CEGEP Biology 301 or equivalent

Note: This course will be given as BIOL 226 in 1995-96.

BIOLOGY 320 - HISTORY OF BIOLOGY

(3 credits) - lectures only

Not offered in 1994-95; 1995-96 T.B.A.

Instructor T. B. A.

Description This course traces the development of biological thought and discussion from the naturalistic approach of pre- and early historic times to the synthetic approach of modern times. Emphasis will not be on who, what, when, and where, but rather on recognizing the importance of social, religious, economic and political factors that together shaped the scientists and constrained the questions that they asked.

Assignments & Grading There will be several in-class assignments as well as a mid-term and final which are both essay exams.

Prerequisite Any 12 credits in Biology

BIOLOGY 321 - EVOLUTION

(3 credits) - Lectures only

Offered winter 1995; 1995-96 T.B.A.

Instructor T. B. A.

Description The course will begin by explaining evolutionary principles of macroevolution and continue by examining these principles in light of a particular taxon, the Hominids, of which our species, Homo sapiens, is the sole surviving member. Emphasis will be on the interaction of environment, behaviour, and biology at each of the various stages of human evolution.

Assignments & Grading Grades will be based on a mid-term, final, and several in-class assignments.

Prerequisite Any 12 credits in Biology.

BIOLOGY 322 - BIOSTATISTICS

(3 credits) - Lectures and Tutorial

Offered fall 1994, fall 1995, and winter 1995 if numbers warrant

Instructor T. B. A.

Description This course explores the application of statistical methods to biological data, and emphasizes the integration of statistical methods and experimental design in hypothesis testing. Materials covered include: basic experimental design; descriptive statistics for central tendency and dispersion; frequency distributions; basic probability theory; statistical inference and hypothesis testing; the normal, Poisson, and binomial distributions; Student's t-test; Analysis of Variance, Correlation and Regression; Chi-square; and non-parametric alternatives for common parametric analyses.

Assignments & Grading Students are evaluated on the basis of mid-term and final exams, assignments and weekly quizzes.

Prerequisite Twelve Biology credits in any Biology Department Major. Specialization or Honours programme.

BIOLOGY 323 - BIOLOGY OF AGING

(3 credits) - Lectures only

Offered fall 1994, fall 1995

Instructor H. Enesco

Description In this course we will ask many questions: What are the differences between organisms which age and those which do not? What physiological changes take place in aging? Has there been selection for or against aging in the course of evolution? What are the cellular changes which take place in aging? Does aging change cell division potential?

With this background we will examine what factors may influence lifespan, such as diet, exercise, chemicals. We will examine some of the theories which have been put forward to explain aging, the extent to which molecular repair capability affects aging, and the role of the nervous system, immune system, and endocrine system in aging.

Assignments & Grading Short term-papers are required. Seminars may be required. Mid-term and final examination.

Prerequisite BIOL 230 and 261 (BIOL 261; BIOL 230 or BIOL 298D, 298E after 1994-95)

BIOLOGY 331 - COMPARATIVE VERTEBRATE ANATOMY

(6 credits) - lectures and laboratory

Offered fall & winter 1994-95 and 1995-96

Instructor K.S. Dhindsa

Description A comprehensive study of the anatomy, development and evolution of vertebrate systems, from the lower chordates through the Agnathas, fishes, amphibians and the reptiles to the birds and mammals. Comparative anatomical changes are correlated with the adaptive radiation, evolutionary trends and biological/ecological systems of chordates. The lectures begin with an introduction to the nature, principles, domain of comparative anatomy and vertebrate pedigree. The comparative study of the vertebrate organ systems for the various groups discussed are: integument and its derivatives, supporting tissue and the skeleton, muscles, body cavities, respiratory structures, alimentary systems, excretory and reproductive systems, circulatory systems, sense organs, nervous system, endocrine glands.

The laboratories involve extensive morphological study and general survey of the major groups of chordates. Comparative study of the vertebrate systems through dissections (molgula, lamprey, shark, turtle, pigeon and the cat), series of skeletons, prepared slides, preserved and mounted dissected specimens.

Assignments & Grading Grades are compiled from the results of periodic laboratory and demonstrations plus mid-term and final laboratory and theory examinations.

Prerequisite BIOL 230 (BIOL 230 or BIOL 298D, 298E, and BIOL 227 previously or concurrently after 1994-95)

BIOLOGY 332 - PARASITOLOGY

(3 credits) - lectures and laboratory

Offered fall 1994, fall 1995

Instructor J.D. McLaughlin

Description The course will give some insight into the scope of Parasitology. A representative sample of parasites from the following Phyla will be studied with special reference to the parasites of man: Protozoa (Sarcodina, Apicomplexa, Flagellata and Ciliata), Nematoda and Acanthocephala along with a brief look at the Arthropoda. Lecture material will be supplemented in the laboratory by the study of prepared slides. Students will also have an opportunity to study the phenomenon of parasitism by carrying out a systematic parasitological examination (necropsy) of a frog. Parasites recovered will provide material for staining and mounting techniques.

Assignments & Grading The final mark will be based on a midterm test and final exam accounting for 70% of the mark and a final lab exam accounting for 30% of the mark. A pass in the laboratory exam is required to pass the course.

Prerequisite BIOL 230, 337 recommended (BIOL 230, BIOL 298D, 298E, 227 after 1994-95)

BIOLOGY 334 - VERTEBRATE EMBRYOLOGY

(3 credits) - Lecture and Laboratory

Offered winter 1995; winter 1996

Instructor R. Cronin

Description An introduction to the description of orderly acquisition of form and structure in developing vertebrates. Topics cover gametogenesis, fertilization, organogenesis, morophogenesis and metamorphosis. A survey of the developmental anatomy of representative vertebrates, using slides and models is conducted in the laboratory.

Assignments & Grading Theory exams, based on essay questions, end of term. There are lab assignments and quizzes and a final laboratory examination. The grading scheme is 60% theory, 40% labs.

Prerequisite BIOL 230 (BIOL 230 or BIOL 298D, BIOL 298E, and 227 previously or concurrently after 1994-95)

BIOLOGY 335 - HISTOLOGY I

(3 credits) - Lectures and Laboratory

Offered fall 1994, fall 1995

Instructor S.M. Ruby

Description This course consists of a microscopic study of the organization into basic tissue types. The histology of tissues will be examined at the ultrastructural, histo-chemical and physiological levels and these features will be related to the functioning of the various tissue forms. Epithelium, connective tissues, including areolar adipose, reticular, elastic tissue, cartilage and bone, muscle, nervous and vascular connective tissue will be studied in depth and the student will be introduced to the basic concept of organization of tissues into organs and organ systems.

Assignments & Grading Written and laboratory examinations.

Prerequisite BIOL 230 (BIOL 230 or BIOL 298D after 1994-95)

BIOLOGY 336 - HISTOLOGY II

(3 credits) - Lectures and Laboratory

Offered winter 1995, winter 1996

Instructor S.M. Ruby

Description This course deals with the organization of the basic tissues into organs and organ systems. It will include the following systems: digestive system and associated glands (liver, pancreas and salivary glands), respiratory, excretory, endocrine, reproductive and haemopoietic systems. The functioning of these systems in relation to these histological structures will be stressed. Wherever possible the comparative aspects of various organs throughout the vertebrates will be examined.

Assignments & Grading Written and laboratory examinations.

Prerequisite BIOL 335

BIOLOGY 337 - INVERTEBRATE ZOOLOGY I

(3 credits) - Lectures and Laboratory

Offered fall 1994, fall 1995

Instructor J.D. McLaughlin

Description The course involves a detailed examination of the lower (non-coelomate) invertebrates. Lectures will cover morphology, physiology, phylogeny and evolution. The physical and physiological adaptations of each group to their respective environments will be stressed.

Laboratory work will concentrate on the morphology and life histories of groups examined during the lecture period. Where possible live material will be used to demonstrate various physiological and behavioral aspects of selected species.

Assignments & Grading The final mark will be based on a mid-term exam and final exam accounting for approximately 70% of the final mark and a final laboratory exam worth approximately 30%. A pass in the laboratory exam is required to pass the course.

Prerequisite BIOL 230 (BIOL 230 or BIOL 298D, 298E and 227)

BIOLOGY 338 - INVERTEBRATE ZOOLOGY II

(3 credits) - Lectures and laboratory

Offered winter 1995, winter 1996

Instructor J.D. McLaughlin

Description This course is designed to follow Biology 337 and has minimal overlap with General Zoology. The subject matter deals with the coelomate invertebrates, i.e. the Annelids, Molluscs, Arthropods (excluding insects), Echinoderms and if time permits, other minor groups. Lectures will cover morphology, some physiology and adaptive radiation in the various groups.

Laboratory work will concentrate on the morphology of selected representatives and will be based largely on dissections. Where possible, living specimens will be used to illustrate the mechanics of locomotion, filter feeding, etc.

Assignments & Grading The final mark will be based on a mid-term and on a final exam accounting for approximately 70% of the final mark, and a final lab exam worth approximately 30%. A pass in the laboratory exam is required to pass the course.

Prerequisite BIOL 337

BIOLOGY 344 - BIOLOGY OF ALGAE

(3 credits) - Lectures and Laboratory

Not offered 1994-95; 1995-96 T.B.A.

Instructor T. B. A.

Description A study of the morphological, physiological, and ecological diversity in algae with emphasis on the distinguishing characteristics of each major group. Topics include the commercial and industrial uses of algae, the use of algae as pollution indicators and the influence of algae on the environment. Laboratories are designed to enable the student to collect, identify and quantify algae specimens from fresh water ecosystems. The physiology of representative cultured algae will also be examined.

Assignments & Grading Lab reports and projects; mid-term examination; final exam

Prerequisite BIOL 240 (BIOL 240 or BIOL 298D, 298E, and BIOL 227 previosuly or concurrently after 1994-95)

BIOLOGY 346 - PHYSIOLOGY OF PLANT DEVELOPMENT

(3 credits) - Lectures and Laboratory

Offered winter 1995, winter 1996

Instructor B.S. Mangat

Description Physiological and biochemical aspects of plant growth and development. Plant responses to growth regulators and their regulators and their mode of action. The role of light and temperature in seed germination, dormancy and flowering. Lectures and laboratory.

Assignments & Grading Mid-term test, laboratory reports, quizzes and final examination.

Prerequisite BIOL 240 (BIOL 240 or BIOL 298D, 298E, and BIOL 227 previously or concurrently after 1994-95)

BIOLOGY 349 - PLANT NUTRITION AND METABOLISM

(3 credits) - Lectures and Laboratory

Offered fall 1994, fall 1995

Instructor B. Mangat

Description A study of the physiological processes of higher plants relating to water relation, mineral nutrition, photosynthesis, carbohydrate and nitrogen metabolism. These processes are discussed in relation to the environmental factors which govern them.

Assignments & Grading Quizzes, mid-term, laboratory and final exam

Prerequisite BIOL 240 (BIOL 240 or BIOL 298D, 298E, and BIOL 227 previosuly or concurrently after 1994-95)

BIOLOGY 352 - PLANT FIELD ECOLOGY

(3 credits) - Field course
Not offered 1994; offered summer 1995

Instructor P. Widden

Description This course is normally offered during the last two weeks of August at the Lacolle Centre. Students are expected to live at the centre for the entire 2-week period. The course will involve the identification of local plant species and the collection and preservation of specimens. The use of relevée analysis, quadrant sampling, line and belt transects and vegetation mapping methods in describing plant communities will be demonstrated. The application of statistical methods to quantitative data on species populations will also be discussed. The course will consist of formal lectures, informal discussion groups, organised field work, individual projects, and an excursion into the Adirondacks to look at plant communities in the mountains.

Assignments & Grading Students will be required to hand in a written report and a pressed plant collection on completion of the course.

Prerequisite BIOL 240, 250 and 322 (BIOL 240, 250 and 322 or BIOL 298D, 298E, 227 and 322 after 1994-95)

Campus Lacolle Centre

Please note: This course is given during the 2 weeks preceeding the start of Fall Semester. Students must register for Summer Session.

BIOLOGY 355 - FUNDAMENTALS OF LIMNOLOGY

(3 credits) - Lectures only

Offered fall 1994; 1995-96 T.B.A.

Instructor T.B.A.

Description An introduction to the study of inland water ecosystems with an emphasis on the physical, chemical, and biological features of lakes. Topics include formation and type of lake basins, optical and thermal properties of lakes, distribution and cycling of major nutrients, a description of the major taxa inhibiting lake ecosystems and the factors affecting community structure in lakes. Other topics will include the features of specialized lakes (e.g. inland saline lakes), pollutants, and eutrophication. The course will consist of lectures and informal discussion.

Assignments & Grading Evaluation is based upon a mid-term exam, a final exam, and written assignments.

Prerequisite BIOL 250 (BIOL 250 or BIOL 298D, 298E after 1994-95)

BIOLOGY 356 - MICROBIAL ECOLOGY

(3 credits) - Lectures and Laboratories

Not offered 1994-95; offered winter 1996

Instructor P. Widden

Description The course is designed to give an understanding of the environments in which microbes live, the structure and organization of microbial communities and the interactions between different groups of microorganisms. Topics discussed will include the structure of soils, water relations, nutrient supply, the role of microorganisms in the degradation of organic substances, nutrient cycling, microbial symbioses, parasitism and predation, microbial succession and the relative contributions of different taxonomic groups to the decomposition process. The major stress will be on terrestrial organisms, but some time will be devoted to the discussion of aquatic systems. The course will consist of lectures, student seminars, informal discussion and an integrated laboratory project.

Assignments & Grading Grading is based on formal laboratory reports, a mid-term and final theory examination and on a seminar presentation.

Prerequisite BIOL 250 and 270 (BIOL 250, 270 or BIOL 298D, 298E, 227 after 1994-95)

BIOLOGY 358 - INTRODUCTION TO ANIMAL BEHAVIOUR

(3 credits) - Lectures and Tutorials

Offered fall 1994, fall 1995

Instructor L.-A. Giraldeau

Description An introduction to behaviour with emphasis on the proximate causes of behaviour as well as its evolutionary significance. Topics will include perception, learning, communication, homing, development, genetics, innate motor patterns and behaviour cycles.

Assignments & Grading Midterm and Final Examination plus, participation to tutorials and term papers.

Prerequisite BIOL 250 (BIOL 250 or BIOL 298D, 298E after 1994-95)

BIOLOGY 359 - EVOLUTIONARY ECOLOGY

(3 credits) - Lectures

Offered winter 1995, winter 1996

Instructor D. Fairbairn

Description This course covers current topics in evolutionary ecology. The aim of the course is to provide students with the knowledge and ability to understand and critically evaluate evolutionary hypotheses in ecology and behaviour. Mechanisms of adequately testing such hypotheses are also considered.

The emphasis is on case studies of topics of current interest, and therefore the course content may vary from year to year. We begin with a formal review of the meaning and mechanisms of natural selection and evolution. We briefly consider issues such as genetic versus non-genetic variability, the efficiency of selection, and the unit of selection. This introductory section is followed by case studies which analyse the adaptive significance and evolution of various ecological traits and processes. In this section we discuss the evolution and adaptive significance of traits such as mimicry, tolerance to pollutants, senescence, body size, sex ratio, sexual reproduction, sexual size ratio, age at first reproduction and reproductive effort.

Assignments & Grading Students are evaluated on the basis of midterm and final exams plus one essay.

Prerequisite BIOL 250, 261 (BIOL 261; BIOL 250 or BIOL 298D, 298E after 1994-95)

BIOLOGY 363 - CYTOGENETICS

(Formerly Biology 467)

(3 credits) - Lectures only

Offered fall 1994; fall 1995

Instructor H. Enesco

Description This course is designed to complement courses in cell and molecular biology and genetics, and is a concentrated examination of chromosomes, both plant and animal, as to their structures, numbers and behaviour, whether normal or abnormal, as well as their roles in species maintenance and diversification. Topics will include: mechanisms of genetic exchange, gene amplification, gene mapping, gene targeting and oncogene action, somatic cell genetics, polytene chromosomes, polyploid adaptations and karyotype analysis in relation to evolution, and human genome project.

Assignments & Grading Final mark is based upon term paper, midterm and final exam.

Prerequisite BIOL 261; BIOL 266 (298C) (BIOL 266 after 1994-95)

Note: Students who have completed BIOL 467 may not take this course for credit.

BIOLOGY 364 - CELL PHYSIOLOGY

(3 credits) - Lectures Only
Offered fall 1994, fall 1995

Instructor J. Kornblatt or R. Roy

Description A course in which cellular function and cellular response to the environment are surveyed. The course concentrates on: i. assembly of biological structures; ii. biological membranes, their structure and permeability properties; iii. transport across biological membranes, transport and nerve function, transport and muscle function; iv. biological energy production, mitochondrial "ox-phos", chloroplast-photophosphorylation, bacterial systems, the proton pumps of all cells; cellular movement, communication among cells, response to stresses (temperature and pressure).

Assignments & Grading Laboratory reports, Mid-term tests and Final exam.

Prerequisite BIOL 266 (298C) and CHEM 222, CHEM 271 (BIOL 266 after 1994-95)

BIOLOGY 366 - MECHANISMS OF DEVELOPMENT

(3 credits) - Lectures only

Offered fall 1994; fall 1995

Instructor A. Tsang

Description In this course, our objective is to gain an understanding of the mechanisms controlling the differentiation of cells and the development of organisms. We will consider cell interactions and molecular events in development. Embryonic induction, cell sorting, tissue assembly, control of cell growth, and gene control of cell differentiation will be examined.

We will further explore, as time permits, the biological basis of cancer cell differentiation, of metamorphosis and of regeneration. Transgenic influences on devlopment, growth control, cell growth factors and chemical morphogens may be examined.

Assignments & Grading Short term papers are required. Seminars may be required.

Prerequisite BIOL 261 (BIOL 261; BIOL 230 or 298D, 298E, 227 after 1994-95).

BIOLOGY 367 - MOLECULARY BIOLOGY

(3-credits) - Lectures and Tutorials

Offered fall 1994; 1995

Instructor R. Storms

Description This course is designed to provide students with a thorough background in molecular genetics. The topics covered include an examination of the structure and replication of DNA, chromosome organization, the molecular mechanisms underlying the recombination of DNA, the molecular basis of gene regulation, and how gene expression is tied to intracellular and extracellular factors by signal transduction pathways. The course will conclude by applying an understanding of these topics to an assessment of how oncogenes cause cancer. In an attempt to provide students with an appreciation of the experimental approaches used to do research in molecular biology, several important experiments and the methodologies used to perform them, will be covered. This will introduce students to recombinant DNA methodologies such as gene cloning, DNA sequencing and in vitro mutagenesis.

Assignments & Grading Final grades will be based on a combination of term papers and examinations covering lecture material and assigned readings.

Prerequisite BIOL 261 and CHEM 271

Please Note Students who have received credit for Biol. 398B may not take this course for credit.

BIOLOGY 368 - GENETICS AND CELL BIOLOGY LABORATORY

(3 credits) - laboratory and tutorials

Offered winter 1995; 1995-96 T.B.A.

Instructor R.M. Roy, M.B. Herrington

Description Introduction to the basic laboratory techniques of genetics, molecular biology and cell biology. Experiments will include the isolation, mapping and characterization of bacterial mutantss; isolation and restriction mapping of a plasmid from a transformed strain of Escherichia coli; subcellular fractionation of eukaryotic cells and characterization of the fractions; physiological studies on cell membrane function; and an examination of mitochondrial and photosynthetic electron transport. The tutorial period will be used to present theoretical and practical information about the experiments and to discuss results. Regular attendance at both laboratory and tutorials is required. The final grade will be determined as follows:

Assignments & Grading

25% Participation (attendance, completion of experiments, verbal or written reports of data to demonstrators, cleaning up after completing experiments)

20% Quizzes (scheduled during the tutorial period)

55% Final examination (a 3-hour examination scheduled in the regular examination period)

Prerequisite BIOl 261; BIOL 266, CHEM 212 or 217; CHEM 271; BIOL 364 previously or concurrently (CHEM 212 or 217; BIOl 364 previously or concurrently after 1994-95).

BIOLOGY 370 - INTERMEDIATE MICROBIOLOGY

(3 credits) - Lectures only

Instructor T. B. A.

Description This course is designed to follow Biology 270 and will deal primarily with applied and environmental microbiology. The topics covered will include fermentation and its industrial development; the production of primary and secondary metabolites (antibiotic production); biotransformations of chemicals and production of non microbial substances by genetically engineered microorganisms. The use of microbes to degrade environmental wastes will also be discussed.

Assignments & Grading T.B.A.

Prerequisite BIOL 270 and CHEM 222; CHEM 271 recommended.
(BIOL 226, 261 and CHEM 271 after 1994-95)

BIOLOGY 380 - NUTRITION

(3 credits) - Lectures only

Offered winter 1995; 1995-96 T.B.A.

Instructors T. B. A.

Description This course provides an introduction to the science of nutrition through the study of the metabolism, utilization, and functions of all essential nutrients: proteins, lipids, carbohydrates, vitamins, minerals, fiber and water. Nutritional needs throughout the life cycle are studied and some of the methods available to evaluate the nutritional status of individuals are reviewed. The influence of environmental factors on nutrient intake is discussed, and the consequences of dietary deficiencies are examined.

Assignments & Grading Mid-term and/or essay and final exam

Prerequisite CHEM 222; CHEM 271 recommended

BIOLOGY 381 - BIOLOGY OF POLLUTANTS

(3 credits) Lectures only

Offered fall 1994; 1995-96 T.B.A.

Instructor T.B.A.

Description The purpose of this course is to study the impact of pollution on ecosystems. The major classes of pollutants are considered in relation to their nature, origin and distribution, and particularly their mode of action on individual organisms and ecosystems. Air, water and soil are examined with their rerspective pollutants and major emphasis is given to quantitative assessments of various agents and their effects. The course also includes theoretical and practical aspects of bioassays and an overview of case studies and of control measures.

Assignments & Grading T.B.A.

Prerequisite BIOL 250 (BIOL 250 or BIOL 298D, 298E after 1994-95)

BIOLOGY 383 - ANIMAL PHYSIOLOGY I

(Formerly first half of Biology 333)
(3 credits each) - Lectures and Laboratory
Offered fall 1994; fall 1995

Instructor N. Kapoor

Description A study of basic cellular and physiological mechanisms in vertebrates. Topics discussed include regulation of animal internal environment, neuromuscular physiology, sensory mechanisms and control of body movements.

The laboratories are designed to develop a student's awareness of quantitative approaches in physiology and to introduce students to some simple surgical techniques and basic instrumentation. Various laboratory exercises, demonstrations and projects relate to system physiology in animals. Students are encouraged to gain information from various sources. Some laboratories may include student's participation in seminars.

Assignments & Grading Laboratories are important and form an integral part of the course. A good lab report is expected. Laboratory assignments may also include seminars. Examination question papers include material covered in lectures, assigned readings and laboratories. Examination format may be either multiple choice, short answers, essay type or a combination thereof. Grades are based on lab reports mid-term and final examination.

Prerequisite BIOL 230 and CHEM 271 (BIOL 230, CHEM 271; or BIOL 298D, CHEM 271 after 1994-95)

Note: Students who have received credit for BIOl 333 may not take this course for credit.

BIOLOGY 384 - ANIMAL PHYSIOLOGY II

(Formerly second half of Biology 333)
(3 credits each) - Lectures and Laboratory
Offered winter 1995; winter 1996

Instructor N. Kapoor

Description This course is a continuation of BIOL 383 and includes the study of mechanisms by which activities of major organ systems are coordinated and regulated in vertebrates, especially humans. Topics covered include blood, cardiovascular systems, respiration, water-electrolyte regulation, digestion, and metabolism.

The laboratories are designed to develop a student's awareness of quantitative approaches in physiology and to introduce students to some simple surgical techniques and basic instrumentation. Various laboratory exercises, demonstrations and projects relate to system physiology in animals. Students are encouraged to gain information from various sources. Some laboratories may include student's participation in seminars.

Assignments & Grading Laboratories are important and form an integral part of the course. A good lab report is expected. Laboratory assignments may also include seminars. Examination question papers include material covered in lectures, assigned readings and laboratories. Examination format may be either multiple choice, short answers, essay type or a combination thereof. Grades are based on lab reports mid-term and final examination.

Prerequisite BIOL 230 and CHEM 271 (BIOL 283 after 1994-95)

398A - INTERMEDIATE TOPICS IN BIOLOGY

Subject - Intermediate Concepts in Ecology

Offered winter 1994; and 1995 T.B.A.

3 credits - Lectures

Instructor T. B. A.

Description This course discusses adaptation (in the broadest sense) to the environment: biotic and abiotic. Major topics include response of organisms to termperature, water, oxygen, light and interspecific interactions. Physiological mechanisms will be emphasized.

Assignments & Grading Term paper, mid-term and final examinations.

Prerequisite BIOL 250 previously or concurrently (BIOl 250 or 298E after 1994-95)

Please Note Students who have taken Biology 353 (Intermediate Ecology) may not take this course for credit.

398C - INTERMEDIATE TOPICS IN BIOLOGY

Subject - Plant Interactions with Other Organisms

Offered winter 1994-95; 1995 T.B.A.

3 credits - lectures

Instructor T.B.A.

Description Unlike animals which possess an elaborate immune system and have the ability to escape their predators, plants produce a variety of specific symbiotic organisms, insects and larger herbivors, as well as humans. These complex interactions are discussed withparticular emphasis on the role of plant signals in the adaptation and co-evolution of organisms, as well as their protection against predators. Lectures and discussions.

Assignments & Grading T.B.A.

Prerequisite BIOL 240 (or BIOL 298D); BIOL 250; CHEM 271

BIOLOGY 420 - RADIATION BIOLOGY AND RADIOTRACER METHODOLOGY

(3 credits) - Lectures and Laboratory
Not offered 1994-95; 1995-96 T.B.A.

Instructor R.M. Roy

Description This course attempts to provide students in the biological sciences with a basic understanding ofthe properties of ionizing radiation and its interaction with matter. The production and characteristics of X-rays and techniques of detecting radiation or measuring radiation dose are discussed in detail. The theoretical background and the practical techniques of utilizing the following detectors are presented: geiger counter, gas-flow proportional counter, solid and liquid scintillation counter. The procedures for handling radioisotopes and labeled compounds are discussed.

The effects of ionizing radiation on water and free radical production will be considered. The biological effects of ionizing radiation at the biochemical, cellular, organismal and ecological level will be discussed in detail. Special emphasis will be given to DNA damage, repair processes, cell survival, immune responses, mutagenesis and carcinogenesis.

Laboratories will illustrate the properties of ionizing radiation, operation of X-ray equipment, measurement of radiation dose, operation of various types of counters, and the biochemical and physiological responses of mammalian cell to radiation.

Assignments & Grading Grades are largely based on lab reports (50%) and an essay-type final exam (40%); 10% of the final grade is based on lab and lecture participation.

Prerequisite BIOL 261 and 364 (BIOL 364, 367 after 1994-95)

BIOLOGY 431 - BIOLOGY OF FISHES

(3 credits) - Lectures and Laboratories
Offered fall 1994; fall 1995

Instructor J. Grant

Description A broad introduction to the biology of fishes emphasizing their unique adaptations as aquatic organisms. Lecture topics include systematics, evolution, anatomy, physiology, behaviour, ecology and fisheries management.

Laboratory work includes two, one-day field trips (possibly on weekends) to sample fish communities in local streams, dissecting representative specimens of fishes, keying and identifying local freshwater species, and a visit to the Montreal Biodome.

Assignments & Grading There will be laboratory quizzes in addition to a midterm and final exam. Students will present a seminar on a current topic in fish biology and will write a term paper based on data collected by the class during field trips.

Prerequisite BIOL 230 and 250 (BIOL 230, 250; or BIOL 298D, 298E, 227 after 1994-95)

BIOLOGY 432 - COMPARATIVE AND ENVIRONMENTAL PHYSIOLOGY

(3 credits) - Lectures only
Offered fall 1994; fall 1995

Instructor N. Kapoor

Description The primary theme of this course is the physiological interrelationships between animals, and their environments. A comparative study of selected physiological processes in diverse phyla, dealing with behavioural and physiological adaptations in animals. Lectures and seminars.

Assignments & Grading T.B.A.

Prerequisite BIOL 333 or (BIOL 333 or BIOL 383, 384 after 1994-95).

BIOLOGY 441 - PLANT BIOCHEMISTRY

(3 credits) - Lectures only
Offered winter 1995, winter 1996

Instructor R.K. Ibrahim

Description A lecture course dealing with the biochemistry of natural constituents unique to plants with emphasis on secondary metabolites; their biosynthetic origin and transformations; their "raison d'etre", enzymology and functional significance.

The course starts with a review of the metabolic activities of plant cells and the role(s) of intermediate metabolites in the biosynthesis of natural plant products, then proceeds to deal with the following topics:

Cellulose, hemicellulose and pectins; their assembly and mechanism of cell wall growth; algal cell wall polysaccharides and gel-forming substances.

Origin of aromatic rings in plants; review of plant phenolic compounds including phenylpropanoids, lignins, tannins, flavonoids and cyanic pigments; enzymes and regulation of phenolic metabolism.

Biosynthesis of terpenoid compounds; variety and role of volatile oils, abscisic acid, gibberellins, sterols, cardiac glycosides, carotenoids and rubber.

Nitrogen metabolism and origin of alkaloids; review of the most important groups of alkaloids with reference to their economic and pharmacologic significance.

Plant tissue and cell cultures and its potential in the production of secondary plant products and biotransformation studies.

Assignments & Grading Final grade is divided among the following: two or three assignments, and a final examination.

Prerequisite CHEM 271

PERSPECTIVES IN PLANT TISSUE CULTURE AND PLANT BIOTECHNOLOGY

(3 Credits - Lectures and Seminars)

Offered fall 1994; fall 1995

Instructor Dr. B.S. Mangat

Description The course will deal with various aspects of plant cell and tissue culture, culture tools and techniques. The course will also discuss the biotechnological methods being employed for plant improvement, the transformation of plants by somatic and gametosomatic hybridization and the use of *Agrobacterium* and other vectors for nuclear material transfers.

Assignments & Grading Student's performance is evaluated on the basis of a term paper, seminars, mid-term and a final examination.

Prerequisite BIOL 346

BIOLOGY 452 - ECOLOGICAL GENETICS

(3 credits) - Lecture and Tutorials

Not offered 1994-95; 1995-96 T.B.A.

Instructor D. Fairbairn

Description This course explores the interface between population ecology, population genetics, and evolution. Topics covered include: methods of detecting genetic variation in natural populations; patterns of genetic variation in natural populations; adaptation, fitness and selection; migration and gene flow; mutation; quantitative inheritance; population structure; maintenance of genetic variation in natural populations; classical, balance, and neo-classical theories; and methods of measuring natural and sexual selection in natural populations.

Assignments & Grading Students are evaluated on the basis of mid-term and final exams, plus seminar presentations.

Prerequisites BIOL 322 and 359 or permission of the instructor

BIOLOGY - 453 - BEHAVIOURAL ECOLOGY AND SOCIOBIOLOGY

(3 credits) - Lectures and Tutorials
Offered winter 1995; winter 1996.

Instructor Luc-Alain Giraldeau

Description A survey of the ecological aspects of behaviour and the underlying biological basis of social behaviour in both vertebrates and invertebrates.

Topics include simple optimality and evolutionarily stable strategies, foraging theory, territoriality, aggression, mate selection, mating systems, parental care, altruistic behaviour, kin selection and group selection.

Assignments & Grading Mid-terms and final examination, participation in tutorials and tutorials and possibly a term paper.

Prerequisite BIOL 358

Please Note: Students who have taken BIOL 498P will not receive credit for this course.

BIOLOGY 454 - POPULATION ECOLOGY

(3 credits) - Lectures only

Offered winter 1995, fall 1995

Instructor E. Maly

Description A theoretical approach to ecological problems. This is an advanced course designed to acquaint students with ecological studies that contain a large element of theory. Topics may vary in different years but will include most of the following: evolutionary aspects of ecological problems, population dynamics, species diversity, stability of ecosystems, regulation of population size, resource partitioning (competition and its avoidance) predation, island biogeography, and succession.

Many aspects of the topics discussed do not yet have substantial field or laboratory documentation; the class will attempt to outline possible procedures for obtaining evidence.

Assignments & Grading Reading assignments will be from original literature. Students may be assigned problems, and it is expected that students will have some working knowledge of CEGEP level calculus courses.

Prerequisite (6 credits from BIOL 352, 355, 356, 357, 358, 359, 398A, and 453)

456 CURRENT ADVANCES IN ECOLOGICAL RESEARCH

Offered winter 1995; fall 1995

(3 credits - Lectures and Seminars)

Instructor D. Fairbairn

Description This course aims to familiarize advanced undergraduate students with all aspects of research in modern ecology, and to teach them to critically evaluate the literature. Evaluations are made both orally and as written critiques, and students learn to address issues of experimental design, statistical analysis, clarity of hypotheses, as well as completeness, clarity, and appropriateness of conclusions. Topics may include studies in evolutionary, behavioral, population, community, systems and conservation ecology. During the first half of the course, we review a recent book on a controversial topic. The review takes the form of chapter by chapter seminars presented by students, followed by class discussion. During the second half of the course, students review papers from the recent literature (past 5 years) and present these to the class in the form of seminars. Papers are chosen in consultation with the instructor. In addition to oral presentation, students must prepare written critiques and insightful, written questions concerning the papers and book chapters presented.

Assignments The final grade is based on oral presentations, written critiques, and weekly, written questions. Generally, each student prepares 3 oral presentations, 3 critiques and a minimum of 12 written questions. There are no exams.

Prerequisites BIOL 322 or equivalent, plus a minimum of 3 credits from BIOL 352, 355, 356, 357, 358, 359, 398A, 454. Third year standing is recommended.

BIOLOGY 461 - ADVANCED GENETICS
(3 credits) - Lectures and Seminars

Offered winter 1995; 1995-96 T.B.A.

Instructor C. Beckman

Description This course will survey some of the major advances in the understanding of gene and genome function that have been facilitated by the rapid development of methods in genetic analysis over the last decade. By studying the original research that has led to these advances we will also develop a familiarity with the methods of genetic engineering and biotechnology. Course topics will include techniques in recombinant DNA, the role of DNA methylation in gene regulation, genome rearrangements, transposable elements, and eukaryotic viruses. The course is organized around lectures and student presentations.

Assignments & Grading Grades will be based on take-home exams and the student's presentation.

Prerequisite BIOL 261; BIOL 262 or CHEM 374 recommended. (BIOL 367 or BIOL 398B after 1994-95).

BIOLOGY 462 - IMMUNOLOGY

(3 credits) - Lectures and Conferences

Offered fall 1994; not offered 1995-96

Instructor J.A. Kornblatt

Description A course in modern immunology stressing the following areas of study: the structure and properties of antigens and antibodies; the nature of the immune response: B-cell responses, T-cell responses; genetic aspects of the immune system; theories relating antibody specificity to genetic potential.

Assignments & Grading Weekly quizzes, optional final

Prerequisite BIOL 261, 364; CHEM 271 previously or concurrently (BIOL 364 after 1994-95)

BIOLOGY 464 - ADVANCED CELL PHYSIOLOGY

(3 credits) - Lectures only

Offered winter 1995; 1995-96 T.B.A.

Instructor T.B.A.

Description In this course an attempt is made to discuss current topics in cell biology and biochemistry. Methods of in vitro culture of mammalian cells are presented. Other subjects covered include detailed discussions of: the biochemistry of the cell cycle, the cell surface, factors involved in the control of cell replication in normal and tumour cells, mechanisms of peptide and steroid hormone action, second messenger generation, cell hybridization techniques and their applications in the study of the control of gene expression.

Assignments & Grading Essay and final examination.

Prerequisite BIOL 364; CHEM 271 previously or concurrently. (BIOL 364 after 1994-95)

BIOLOGY 465 - BIOLOGICAL REGULATORY MECHANISMS

(3 credits) - Lectures and Conferences

Not offered 1994-95; offered winter 1996

Instructor E.B. Newman

Description A survey of methods used by cells to control therates of biochemical reactions. Cells are rarely wasteful; products they make are made in just the amounts needed. The cell can respond rapidly to changes in its environment, ceasing to make compounds which are suddenly supplied to it - or starting to make others as called for.

The controls on enzymatic reactions which allow this efficiency are surveyed in this course. Effects on enzyme activity (feedback inhibitions, enzyme-catalyzed enzyme modification, induction, etc.) - among others - are considered.

The emphasis of this course is on the logic of scientific experimentation. The course discusses the experimental evidence on which concepts of enzyme regulation are based, which experiments are likely to give answers, how ideas in the field have developed.

Assignments & Grading Exams consist largely of experimental results from the literature which students are asked to analyze. Students are also asked to do reports on three papers from the current literature.

Prerequisite BIOL 261; CHEM 271; or permission of the Department.

BIOLOGY 468/4 GENE STRUCTURE

(3 credit - Lectures only)

Offered fall 1994; fall 1995

Instructor R. Storms

Description This course deals with gene regulation in eukaryotes. Topics covered will include transcription, transcript processing, translation, and posttranslational processes.

Assignments & Grading Final grades will be based on a combination of term papers and examinations covering lecture material and assigned readings.

Prerequisite BIOL 367 (398B)

Please Note: Students who have received credit for BIOL 498D may not take this course for credit.

BIOLOGY 469 DNA REPAIR

Offered winter 1995, winter 1996

Instructor C.G. Cupples

Description Course will cover a series of topics concerned with chemical alterations to replicating and non-replicating DNA arising spontaneously, or as a result of exposure to exogenous mutagens. Mechanisms of enzymatic repair of DNA damage in procaryotes and eucaryotes will be considered, with emphasis on the experimental approaches which have led to our current knowledge. The role of defective DNA repair in human diseases will also be examined. Lecture and exam material will be drawn from recent scientific papers. Lectures only.

Prerequisite BIOl 261; 364 or 365 and CHEM 271 (BIOL 367 after 1994-95).

Please Note: Students who have received credit for BIOL 498I may not take this course for credit.

BIOLOGY 470 - MICROBIAL PHYSIOLOGY

(3 credits) - Lectures only

Offered winter 1995, winter 1996

Instructor T. B. A.

Description A survey of the diverse ways in which microorganisms derive energy and build cell constituents. How does an organism like Thiobacillus thiooxidans survive at pH 1 and derive energy from oxidizing sulfur? Is its metabolism fundamentally different from that of E. coli which lives in an animal intestine at 37°C, from B. stearothemophilus which carries out its metabolic affairs at 55°C, or from a methane bacterium that won't grow at all if any oxygen is present?

The course surveys the biochemistry of energy-yielding reactions, compares pathways in similar and diverse organisms, and considers metabolic balance sheets. In addition, an attempt is made to understand the ecological niche of organisms in terms of their biochemistry i.e., in what ways are organisms diverse. On the other hand an attempt is made to derive some general principles of the biochemical requirements for microbial life by finding the similarities in diverse organisms.

Assignments & Grading To be arranged with participants in the course.

Prerequisite BIOL 270; CHEM 271; 3 credits advanced biochemistry previously or concurrently. (BIOL 298D, 298E and CHEM 271 or permission of the dept. after 1994-95)

BIOLOGY 490 - INDEPENDENT STUDY

(6 credits)

Instructor Faculty

Description This program provides an opportunity for 3rd year students to conduct independent laboratory and literature research on a topic of special interest. This course is particularly suited for students who are considering a career in research, for it tests one's ability to think creatively and critically, to appreciate and develop concepts, to acquire in-depth knowledge, to analyze and solve problems, and to conduct laboratory projects in Biology with skill.

Assignments The projects will be graded on the basis of the work done, the written thesis and the oral defense of the thesis. Because students must obtain an agreement from a Biology professor to supervise their projects, they are advised to make these arrangements and notify the program's Co-ordinator at the end of their 4th semester of study.

Prerequisite 3rd Year Honours Programme. Students with high academic standing in 3rd year Biology Specialization programme may be granted permission to take this course.

Please note: Students must obtain permission of Dr. J.D. McLaughlin (BIOL 490 Coordinator) to register for this course. Students register for Biol 490/2 if work started in winter or summer semesters.

BIOLOGY 498A - ADVANCED TOPICS IN BIOLOGY
Subject - Plant Responses to Stress

(3 credits) Lectures only

Instructor R. K. Ibrahim

Description This course deals with the biochemical and physiological responses as well as ecological adaptations of plants to environmental abiotic and biotic stresses. These include the tolerance of plants to cold, drought, high salinity and xenobiotics, as well as the effects of ultraviolet and ionizing radiation on plant processes. In addition, the interaction of plant chemicals, as signalling molecules, with insects, other herbivores and soil micro-organisms will be emphasized. Examples will be chosen to highlight genetic engineering strategies for improving plant productivity and tolerance to stresses.

Prerequisites BIOL 240, CHEM 271 and a minimum of 3 credits from the following: BIOL 349, BIOL 356, BIOL 364, BIOL 370 or CHEM 375

BIOLOGY 498B - ADVANCED TOPICS IN BIOLOGY

Subject - Biochemistry and Genetics of Disease

(3 credits - lectures only)

Instructor J. Kornblatt and staff

Description This course will cover recent advances in our understanding of the genetics, molecular biology and biochemistry of disease. Topics covered may include: biochemical basis of bacterial diseases; identification of genes, and the resulting biochemical defects, responsible for specific diseases; enzyme inhibitors as drugs; gene therapy; prenatal diagnosis, detection of carriers; mechanisms of drug resistance in bacteria and viruses; emergence of new pathogens, etc.

Assignments & Grading T.B.A.

Prerequisites CHEM 271; CHEM 374 or BIOL 367 (formerly BIOL 398B)

BIOLOGY 498V -ADVANCED TOPICS IN BIOLOGY

Subject - Mechanisms of Protein Synthesis

Offered fall 1994; fall 1995

Instructor M. Herrington

Description The translation of the nucleotide sequence of a messenger RNA into the amino acid sequence of a protein involves over one hundred different proteins and RNA molecules. We will examine the current research on the role of these molecules in translation. This will involved both in vivo approaches and in vitro approaches. Specific topics may include how aminoacyl tRNA synthetases recognize the appropriate tRNA, how the ribosome slips or hops while decoding mRNA, and the role of ribosomal RNA. Readings will be selected from the current literature.

Assignments & Grading The final grade will be based on examinations, assignments and class participation.

Prerequisites BIOL 261 and CHEM 271; CHEM 374 recommended.

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY (Continued)

498X- ADVANCED TOPICS IN BIOLOGY
Subject - Plant Molecular Genetics

Offered fall 1994; fall 1995

Instructor P. Gulick

Description This course will survey topics in the rapidly developing field of plant molecular genetics and plant biotechnology. Many innovative applications of the modern methods of genetic engineering are being applied to the investigation of plant biology and to crop improvement. This course will discuss the analysis of genome structure, mRNA population complexity, gene cloning strategies, gene transfer in plants, transposable elements, restriction fragment length polymorphism (RFLP), and molecular analysis of host parasite interaction.

Prerequisites BIOL 261 and CHEM 271; BIOL 262 or CHEM 374 recommended